Food Manufacture

Incorporating Canning, Packing, and Preserving

Vol. VIII. February, 1933 No. 2

Asparagus.

A RECENT bulletin issued by the Ministry of Agriculture deals with the growing of asparagus as a commercial crop in this country. A tariff has been placed on imported asparagus, and it is the opinion of those competent to judge that there are great possibilities in this direction. Some growers intend to grow asparagus involving the use of machinery, as is common in America, instead of by hand labour. This should enable them to produce the fern at a lower cost and so open up a market with the canneries. In 1925 there were some 1,100 acres under asparagus, but this did not include the small holdings, where doubtless much is cultivated. This acreage would produce at the most 2,000 tons, which is insufficient for home consumption, and in 1931, 1,680 tons were imported from France alone. In that year about 18,000 tons of bottled or canned asparagus came to us from California. The American growers cultivate by machinery as far as possible, and large-scale field planting on the flat is the prevailing practice in California, where the cost of production has been reduced to such an extent that the canning factories have processed enormous quantities. In England asparagus is cultivated in Worcestershire, Lancashire, Cambridge, Essex, and Devon. The climate and ground are favourable, and there are undoubted possibilities for the enterprising farmer to produce a profitable and valuable crop.

As little has been published on the canning of asparagus, we are glad to inform readers that an article on this subject will be published in the April issue of FOOD MANUFACTURE.

World Agriculture.

Those interested in the problem of world agriculture would be well advised to read the newly published *International Survey*, a report by a study group of members of the Royal Institute of International Affairs, under the chairmanship of Lord Astor. To begin with, a carefully framed questionnaire was sent to influential men in many countries. The *Survey* consists of the answers to these questions, together with other information obtained from the economic publications of the League of Nations and the International Institute of Agriculture at Rome.

The book is a survey, pure and simple, and propounds no solution, but it places before the reader solid facts in a clear and logically arranged manner. Many of the falls in prices of agricultural products such as wheat and sugar are shown not to be so much the result of agricultural conditions, but the effect of the general economic debacle which affects the whole world. Hence, for any material return of prosperity, the farmers must await better times all round—quite apart from agriculture. In the meantime the danger of overproduction must be carefully guarded against. The production of foodstuffs, such as wheat, should not increase more rapidly than population; yet that is precisely what has happened. For complete and interesting data on this most important subject we refer our readers to the *Survey* itself.

Insects and Weeds.

The control of weeds by insects in New Zealand was the subject of an interesting article in *The Times* of December 29, 1932. This has been followed by a letter by Sir E. J. Russell, in which the part played by the entomological department of the Rothamsted Experimental Station is described. The work was begun in 1921 with the breeding of parasites for the control of certain insect pests in New Zealand, and was later extended to the investigation of the possibility of controlling ragwort and gorse by insects. After a detailed study of various possible insects, supplies of suitable ones had to be transported from the experimental station to New Zealand, where tests were carried out on the large scale. It is confidently believed that the quantities of insects now available will prove sufficient to keep the weeds in check, but the time may come when some action will have to be taken against the insects themselves. It is, therefore, necessary to have methods available for the control of

these insects as soon as the need arises, and such work is being carried out at Rothamsted, where Dr. William is studying the factors that make for increases and decreases in insect population.

This profitable use of insects under suitable control is providing some sort of an answer to the question, "Of what use are insects in our civilised life?" Doubtless more can be done with them than training them for our amusement, as in the case of the performing fleas, and if they can be utilised for the assistance of agriculture in this way man will have achieved yet another success in the profitable utilisation of the resources at his command.

Rationalisation.

Reviewing the world's present commercial and industrial problems, Sir Harry M'Gowan, at the Annual Ramsay Chemical Dinner held in Glasgow, said that although there had been, and still was, a tendency to be contemptuous of the idea expressed by the word "rationalisation," yet it represented a principle of great value. He attributed our loss in competitive power largely to the fact that British industry had not kept pace in recent years with progress elsewhere in industrial organisation.

He also referred to one effect of the rapid advance of science. Manufacturing plant was designed and intended to endure over such a period as would permit of its cost being provided out of the profits it returned. To-day, however, the manufacturer, when weighing the pros and cons of installing new plant, whether for the extension of existing processes or for developing new products, was haunted by the possibility that new scientific discovery or technical development might shortly reveal more economical methods of effecting his purpose. As a safeguard, liberal provision for obsolescence became a cardinal point in financial policy. But heavy expenditure on scientific research could not be withheld. Indeed, its necessity was perhaps increased rather than diminished.

Factory Cleanliness.

An interesting discussion on factory cleanliness in the food industry took place on January 20 at the Royal Sanitary Institute, in which the Food Group participated, under the chairmanship of Major Sir Isidore Salmon, M.P. The discussion was opened by E. B. Hughes, who was followed by B. G. McLellan, A. Andersen, and several officers of the Ministry of Health.

Mr. Hughes made an admirable survey of the various points which have to be taken into consideration in planning a factory according to the present-day conceptions. He dealt with, in turn, the location of the factory, the construction of the walls and floors, the cleaning of utensils and machinery, and the part played by the works chemist in maintaining a high standard of cleanliness. Mr. Hughes advocated tiled walls and floors, metal shelves separated from the walls, metal or marble tables, careful and repeated cleansing of all equipment, utensils, and machinery by detergent solutions followed by a hot-water rinse, and daily inspections by the chemist to see that the work is thoroughly done and, by taking samples from various surfaces, that it is done effectively.

Mr. Andersen discussed the points to be observed in the storage of boxes and packing materials in order to prevent them from becoming damp and developing moulds, which are liable to infect the air and consequently the food products being manufactured. He also drew attention to the necessity for periodical renewal of water in storage tanks and the thorough cleaning out of these tanks at the same time.

"Clean food from a clean factory" is the motto.

Why Not?

Someone told the story of the planter who, on finding the coffee was not altogether to his taste, paid a visit to the Chinese cook that he had recently engaged. "How are you making this coffee?" enquired the planter. "Oh, I'm just boiling it up and straining it through this old sock," said the beaming Chink, holding up an article that might have graced the pretty foot of a farm labourer. "Good Heavens, man!" exclaimed the horrified planter. "You don't mean to say you pour my coffee through that thing?" "Sure I do, boss," was the reply. "There ain't no good in dirtying a clean sock!"

Rancidity.

Recent work by Coe and Le Clerc, of the U.S. Bureau of Chemistry (Food Research Division), has shown experimentally that the photochemical action of light is an important factor in the promotion of rancidity in foods. Rancidity is generally assumed to be caused by oxidation or hydrolysis aided by one or more of several factors, such as light, moisture, heat, metallic catalysts, or enzymes. It has been shown by Coe and Le Clerc that the exclusion of light retards the development of rancidity and that green light is the main portion of the visible spectrum which is inactive with regard to the development of rancidity.

Lecithin.

Nottbohm and Mayer have recently determined the lecithin contents of various commercial samples derived from egg yolk and soya beans, using three methods, viz.: calculation of the percentage of lecithin present from (1) the choline content, (2) the phosphorus content, and (3) the nitrogen content. Choline is an essential constituent of egg yolk lecithins, and the method employed in its estimation is described. The results are as follows: Lecithin Kahlbaum *ex ovo*, (1) 60·02, (2) 76·60, (3) 97·41.

Lecithin Merck *ex ovo puriss.*, (1) 70·41, (2) 98·00, (3) 116·58. Three samples from soya beans: (*a*) (1) 13·20, (2) 51·04, (3) 42·55; (*b*) (1) 16·28, (2) 59·40, (3) 47·43; (*c*) (1) 21·08, (2) 72·20, (3) 57·35. Lecisan (also from soya beans): (1) 15·82, (2) 72·40, (3) 58·22.

The variations in results according to the method of analysis and calculation employed are remarkable, as also is the difference in lecithin contents of products obtained from egg yolk and soya beans respectively.

It may be approximately true that the phosphorus is derived solely from lecithin in cases where egg yolk is the raw material, but it is certainly not so for lecithin of vegetable origin. Nottbohm and Mayer suggest that plant lecithins are phosphatid-like substances differing in structure from egg lecithins.

Handling Lobsters.

Trade in live lobsters has come to be a big business on Canada's Atlantic coast, and that is why Dr. A. F. Chaisson, a member of the Biological Board of Canada, has been investigating the best methods of handling them. Dr. Chaisson states that temperatures from 33° to 50° F. are safe for shipping lobsters in air over a protracted period. Within the period of three days required for the average shipment, 50° to 55° F. appear to be equally favourable. Lobsters should be handled gently when taken from the trap, they should be protected from direct sunlight and wind, and the claws should be plugged or banded with wide rubber bands to prevent mutilation.

Shortenings.

In a report on shortenings prepared by a subcommittee of the Research Committee of the American Society of Bakery Engineers, it is stated that the ideal shortening for cake should have a perfectly bland or neutral flavour and odour and a light colour. It should feel plastic, have a good spreading quality, but at the same time should not be tough or rubbery. One should observe the way in which it creams up with the sugar and solid ingredients; a good fluffing and building-up of a light mass which does not break down readily is indicative of a good shortening. It is important, also, that the shortening should have the quality of readily blending or emulsifying with the liquid ingredients of the dough.

Sterilisation by Filtration.

Owing to the fact that the heat-sterilisation of fruit juices is attended with deterioration in flavour, precipitation of unsightly deposits, and certain other drawbacks, it has been suggested that filtration through a "germ-proofing" filter might be employed on a commercial scale. Recently Carpenter, Pederson, and Walsh, of the New York State Agricultural Experimental Station, have made tests to determine if such a method is feasible in practice. They conclude that it is quite possible to sterilise fruit juices by filtration through the commercial-size germ-proofing filter and to obtain a sparkling clear product if proper operating conditions are observed. These conditions are : (1) Sterilisation of the assembled filter and discs by steam; (2) sterilisation of containers receiving the filtered juice; (3) sterilisation of caps or seals; (4) proper attention to pump pressure; and (5) general sanitary room conditions.

Sauerkraut Fermentation.

Some interesting work on the relation between temperature and the rate of fermentation of commercial sauerkraut has been recently carried out by Carl S. Pederson, of Geneva, U.S.A.

The time required for complete fermentation of sauerkraut in 125 vats during three seasons in one factory, when compared with the atmospheric temperature at the time of filling, shows that the lower the temperature at the time of filling the vats the slower is the rate of fermentation.

The rate of fermentation of vats of kraut in other factories shows that there are a number of temperature factors, especially the temperature of the building, which affect the temperature of the shredded cabbage. Because of these other factors, the time which will be required for a vat of sauerkraut to ferment cannot be accurately predicted.

Quality of Sauerkraut.

The same investigator has made analyses of 102 cans of kraut from 71 different packers throughout the United States.

Kraut containing between 2·0 and 2·5 per cent. salt showed the best texture. The salt content also had an effect upon other qualities, but the relationships were so complicated that no definite correlations could be established.

The majority of krauts with a high quality rating show a normal content of volatile acid, total acid, alcohol, and salt. All except two of the samples which rated "poor" or "unsatisfactory" showed an abnormal condition as indicated by the results of one or more of the chemical analyses—*i.e.*, for volatile acid, total acid, alcohol, or salt.

Simplified Chocolate Production.

We note that Robert Whymper describes in an American contemporary (*The Manufacturing Confectioner*) a "unit system" of chocolate production which is claimed to be so simple as to be foolproof, so compact as to utilise the minimum amount of floor space, and so economical in labour that one man could run at least two complete units with one unskilled helper. Liquid sugar is pumped through a continuous cooker, from which the syrup runs into the melangeur, where graining takes place and the moisture content is reduced to less than 0·5 per

cent. Cacao liquor and cacao butter are introduced into the melangeur and the chocolate paste is automatically removed and continuously passed through a three-roll refiner and then through a five-roll refiner. The chocolate so prepared can, of course, be treated subsequently in any manner desired. Conching or heat-treatment in mixers is, in fact, recommended for good quality chocolates.

Mr. Whymper states that a continuous flow of smoothly ground chocolate is secured starting with liquid sugar in a manner that formed the basis for a patent application.

The Wheat Outlook.

The early days of 1933 have seen a distinct recovery in the prices of wheat from the extremely low points that had been reached. The rise may have been encouraged by the buying of Australian and Canadian wheat for the Far East, a recent significant development in grain markets. This may be due to a falling off in the production of rice or to an increased liking for wheat amongst the Chinese. Particularly is this state of affairs welcome to the wheat-producing countries, for Australia now has the Far East as a market as well as England. In the opinion of a well-known authority, "much higher prices will be seen in the early part of this year." Wheat measured against the general commodity index has reached a point which induces grand-scale buying from India and China, and this buying effectively cushions the world-price structure. The Oriental buying in its present aggressive shape would be modified should we experience a sharp price increase peculiar to wheat, but if commodity and security markets in general should be observed to advance, as has been the case in the past few days, the fundamental strength occasioned by present circumstances will remain in force.

Supply and Demand.

The effects of the Federal Farm Board's attempt to beat the law of supply and demand are now becoming more and more evident and clearly show how abortive they were. Reports are accumulating about the co-operation of the United States Government and the American Red Cross towards the relief of destitution by the distribution of "stabilisation" flour. According to the *Manchester Guardian*, these measures have only been in operation for a few months, but already 4,488,000 families have been helped. This flour has been made from the enormous hoard of wheat accumulated by the Federal Farm Board, in its attempt to force up prices. When prices fell in spite of the Board's efforts the wheat became virtually a total loss, because any attempt at sale would have depressed the price of the current crop still further. In any case, the price obtainable in that event would not have covered the cost of storage and distribution. Congress, therefore, gave 85,000,000 bushels for relief purposes, to be distributed by the Red Cross, thereby cutting its losses by a graceful act of charity. At this rate the U.S.A. is being forced to give wheat away in charity as fast as this country uses it for all purposes! It is said that the families so helped are taking about twice as much of this flour as they would buy in the normal way, so that other food supplies are likely to be affected. Of course, the present condition of things cannot last for ever, and the surplus must soon be disposed of, but the Federal Farm Board has no doubt learned its lesson for future reference, and will treat the law of supply and demand with a little more respect.

Milk Education.

Suggestions to ensure a cleaner milk supply were expressed at the meeting of the Food Group on November 25, when the subject under discussion was the bacteriological standards for milk and ice-cream.

Professor G. S. Wilson wound up his able address with the remark that "The aim of the medical officer of health should be to act as an educator, not as a policeman," and this contention was supported by Dr. W. R. Wooldridge, who emphasised the necessity of encouraging the production of clean milk on the farm. He suggested that, in spite of difficulties, much good could be done by the public health veterinary officers, who have both the necessary knowledge and the confidence of the farmer. Mr. P. B. Tustin also remarked on the desirability of medical officers of health continuing their efforts in more intensified form to educate the producer and distributor.

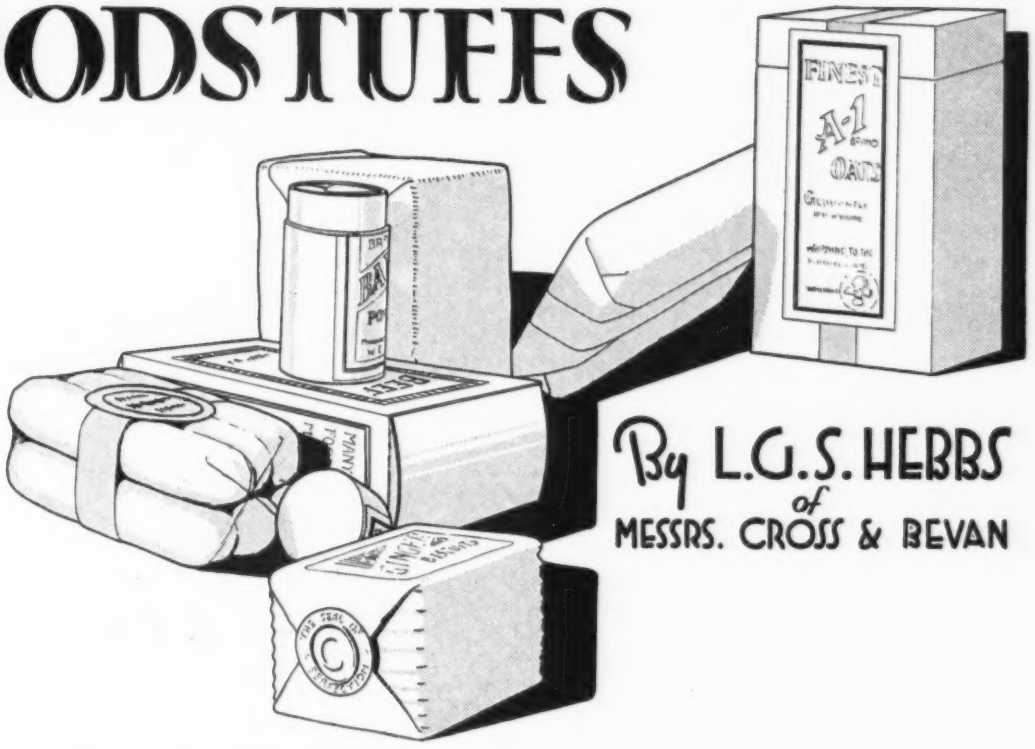
Home Grown Bananas.

The prospects for this and other produce were described by Dr. Alexander Fleck, a director of Imperial Chemical Industries, Ltd., in a paper on a "Possible Trend of Scientific Industry," which he read at Birmingham last month.

It would appear, according to Dr. Fleck, that there is no fundamental reason why these should not be grown in this country, adjacent to our big power stations. We have got quantities of low-grade heat from the condensers of our turbines, or if that is not adequate steam is available from very efficient combustion of fuel, we have any amount of energy for the necessary light conditions, we have plenty of water, we have cheap fertilisers, and we have plenty of CO_2 for the plants to assimilate. He says, therefore, that there ought to be round high efficiency power stations large farms for tropical fruits and produce, and that in these we have the possibility of replacing large quantities of our imports of tropical products.

We fancy the shipping companies (not to mention our colonists) would see the development through anything but rose-coloured spectacles.

WRAPPINGS for FOODSTUFFS



By L.G.S. HEBBS
of
MESSRS. CROSS & BEVAN

IT IS an unfortunate fact that in the selection of wrapping materials for food packing the choice is made predominantly on the basis of price considerations rather than on the suitability of the material for the purpose intended: in merchandising articles low in price the cost of packing is, of course, an important item. Especially is it true when the article to be packed is both low in price and bulky or voluminous, so that relatively large amounts of wrapping material are required. These conditions occur frequently in the food industries, and, as in so many other instances, it is then this question of the cost of the wrapping material which becomes almost the sole controlling factor. There are now available so many grades and types of wrapping material that almost every wrapping problem could be readily solved if cost had not to be considered.

Fortunately, the selling value of good and attractive packing has now been so extensively exploited as to accelerate the allotment of increasing percentages of the final cost to the packing item. In some instances when a relatively expensive wrapping material has been selected, because of its especially suitable properties, the increased expenditure has been more than recouped by other economies which then became possible, in addition to the all-round benefits resulting from the sale and purchase of an article maintained in good and attractive condition.

The enormous number of possible variables in the packing requirements of the food industries makes it desirable to consider the properties of wrapping materials in a general way rather than in relation to a few isolated uses. Special applications can then be readily examined in the light of these considerations.

The peculiar properties of the various wrapping materials which affect their suitability for a given purpose are generally inherent from the processes by which they have been made and the raw materials used. It may therefore be worth while briefly considering their manufacture, as a guide to what might be expected from them.

Paper Making.

The chief raw material for the production of paper is of course cellulose, the structural component of plants. The first step, therefore, consists in isolating this cellulose in as pure a condition as possible, and using such methods as will remove the non-cellulosic materials with the least possible amount of attack on the fibre, or cellulosic component proper. In England, the chief raw materials thus treated are rag and esparto grass, and they are almost invariably processed with caustic soda solution. In countries having large forest areas, notably Scandinavia, and North America, wood is the chief raw material.

There are two principal processes for resolving timber into ultimate fibres. One, the sulphite or bisulphite process, employs an acid extracting medium, and the other uses caustic soda, or more generally caustic soda and sodium sulphide, this latter process yielding the raw material for the strong, dark-coloured "Kraft" wrapping papers. In addition, there is a mechanical method for producing pulp which does not separate the cellulose from the non-cellulosic portion of the wood, but merely grinds the wood as a whole to a fine state of division. This yields "ground wood" which is a very large constituent of newspapers, and is also used in many of the lower-priced wrapping papers, and the board used for such purposes as cigarette containers.

In the paper mill proper the fibres thus obtained from the various sources are then beaten. This beating can be done in a variety of ways to produce a graduated variety of results ranging from an opaque, absorbent blotting paper to a relatively transparent "greaseproof" or imitation parchment paper. To make a smooth even-textured sheet of paper it is desirable that the fibres as used should be not more than 2 to 3 mm. in length. With relatively long fibres such as those from rag, therefore, a considerable amount of actual cutting takes place during the beating. In addition to the above mentioned, physical changes are brought about in a greater or less degree as required, and concomitant with these changes the cellulose acquires an increased capacity for holding water.

The beaten pulp, suitably loaded, sized with resin, and tinted, is diluted with a relatively large amount of water, and converted into a continuous sheet by being run over an endless wire cloth. The wet sheet, from which the greater part of the water has been removed by drainage through the wire cloth, is then dried by passing it over the surface of steam-heated cylinders. If sizing with resin has been omitted, or if further sizing is required, the sheet may now be passed through a bath of gelatine and slowly dried.

It will be seen that in essentials the making of the sheet consists in draining on a sieve a suitably prepared dispersion of fibres in water. It is therefore not altogether surprising that this process should be to some extent reversible, and that such paper should be very weak and easily disrupted when sufficiently wetted. This is, of course, a matter for serious consideration in the food industries, where so many of the articles to be wrapped contain relatively large quantities of water, and sometimes free water.

There are several methods by which this defect may be met, or at least diminished, and by which other valuable properties may at the same time be imparted to the sheet. The paper may be treated with a water-repellent material, so that the sheet is not easily wetted by water, or it may be modified in structure, so that the sheet retains considerable strength when wet.

Waxed Papers.

The cheapest of the water-repellent materials available, and the one which is simplest to apply, is without doubt paraffin wax. Almost any type of paper can be waxed, but certain grades are more suitable than others. The process generally consists in passing the paper, in continuous length, through a bath of molten wax, or in transferring molten wax from a bath to the surface of the sheet by means of a contact roller. There is also a method of hot pressing, which aims at obtaining a more complete penetration of the wax into the paper.

As is well known, cellulose normally retains a considerable quantity of water when in equilibrium with the atmosphere. This amount may vary from six to twelve per cent. on the weight of the cellulose, and will be dependent not only on the atmospheric conditions, but also upon the treatment which the cellulose has received —*e.g.*, in the beater. In passing through a bath of molten wax, and during the hot rolling process which frequently follows, part of this water may be volatilised, with the result that the cellulose loses some of its resilience and suppleness, and becomes relatively brittle. During this process paper commonly may lose some 10 per cent. of its tearing strength. To avoid this defect deliquescent materials are frequently added to the paper to assist it in retaining its moisture content during the waxing processes involving relatively high temperatures.

Lacquered Papers.

Recently the use of water-repellent material other than paraffin wax has been again considered for application to paper, the work in this field having been stimulated by the demand for a so-called "waterproof" wrapping. The general method of approach has been by the use of a coating of the usual cellulose lacquer type, in which the water repellence may have been increased by the incorporation of an oil. As is well known, the greater part of these lacquers consists of volatile solvents and diluents, which evaporate and leave behind a film of cellulose nitrate or cellulose acetate, together with suitable softening or plasticising agents. In some instances the cellulosic constituent has been omitted from the lacquer, which then contains only water-repellent resins and oils. Highly beaten paper of the Glascine type has usually been selected as a basis for coating, since it is already semi-transparent, and becomes more so on coating. A great many such materials have recently been prepared experimentally and on the small scale, and at least one such material is now available commercially.

Vegetable Parchment.

The alternative of producing a paper having considerable strength when wet is realised in the so-called parchmentising process. In this process paper that has been specially prepared to be strong, but absorbent, is treated with cold strong sulphuric acid. The surfaces of the fibres rapidly become gelatinous, and while they are in this condition the paper is pressed between rollers which tend to compact the sheet. The gelatinising or dispersing action of the acid is stopped by rapid dilution and washing with large amounts of water.

The resulting vegetable parchment may be regarded

as no longer paper, in the ordinary sense of a felted fabric of fibres, because after parchmentising it is in effect a continuous film of cellulose, which is almost devoid of fibre structure. Because of this film continuity the sheet is much stronger than before parchmentising, and has considerable strength even when thoroughly wetted. The cellulose has, however, been physically changed during the process, so that if now allowed to dry it becomes hard and brittle. To overcome this defect deliquescent agents, such as magnesium, zinc or calcium chloride, glycerine, or glucose, are used, and the presence of one or other of these substances should be expected and considered when vegetable parchment is to be used for food packing.

It should be borne in mind that vegetable parchment essentially differs from imitation parchment or "greaseproof," in that one is covered by a continuous film and the other is not. This accounts for their very considerable difference in properties, and especially their different resistance to wetting.

Viscose.

Coming now to the more truly transparent wrapping materials, these are really films, and not paper: they may be divided into two main classes. The first and largest class consists essentially of cellulose, and is represented by the various brands, now available, which are produced from viscose. The process employed is very similar to that employed for the production of 85 per cent. of the present world's artificial silk supply. In the parchmentising process gelatinisation and dispersion of the fibre is necessary to produce a continuous film: similarly, in the viscose process, it is first necessary to disperse the fibre. The raw materials employed, wood pulp and cotton linters, are not very different from those used for paper. These materials are treated with caustic soda and carbon bisulphide in such a way that the fibres become gelatinous, and can be thereafter dispersed in caustic soda solution. The resulting viscous dispersion, called viscose, after suitable treatment, is allowed to flow through a long narrow slit on to a drum rotating in an acid setting bath. The film thus obtained is treated to remove precipitated sulphur, derived from the carbon bisulphide, and is then bleached. Here again it is necessary to incorporate a deliquescent agent to prevent the film from becoming brittle. The finished film will therefore contain some such material as glycerine, and in addition, in some instances, may retain traces of sulphur or sulphur compounds, which may be important if the film is to come into contact with metallic surfaces—*e.g.*, bronze printing inks.

These viscose films can be coated with water-repellent materials in a similar manner to the glascine papers already described, and in this way produce a so-called "waterproof" viscose film, which has a very high resistance to the passage of water and water vapour.

Cellulose Acetate.

The other and smaller class of transparent wrapping material consists of film made from cellulose derivatives, such as cellulose acetate. The cellulose acetate, together with suitable softening and plasticising agents, is dispersed in organic solvents to give a viscous "dope" similar to a cellulose lacquer. This dope is allowed to flow on to a highly surfaced gelatine coated endless band, from which, during its passage through hot air chambers, the solvents are volatilised and recovered, leaving behind the finished film. This type of film differs from those previously described in that it holds relatively small quantities of water, and the presence of deliquescent materials is not necessary to keep it in good condition.

Changes in Dimensions.

Possible changes in dimensions are factors which must be considered when a wrapping material is to come into contact with moist articles or conditions. Films made from cellulose acetate show only very small movement with changing humidity conditions. By comparison, vegetable parchment and viscose film both show very large dimensional changes. As is well known, this shrinkage on drying can often be utilised, as is effectively illustrated in the use of the bottle closures and sealing rings also made from viscose. But the effect of the directional factor is often not fully realised. These materials are made in almost endless length, but in relatively narrow widths. The pull or "drag" during manufacture is almost entirely along the length of the material, and this leads to the orientation of the ultimate units of the sheet or film in such a way that very pronounced differences in properties may arise along and across the material.

Samples of viscose film were examined to determine the changes of dimension which occurred when exposed to atmospheres over the range between 0 per cent. and 100 per cent. relative humidity. In one instance the film showed a contraction in width equal to eleven times the observed contraction in length. The stresses which could occur if this factor were overlooked can readily be imagined.

Permeability to Water Vapour.

Recently a great deal of attention has been focussed on wrappings designed to prevent loss of moisture from the articles wrapped. Waxed paper has been used for this purpose for many years—*e.g.*, in bread wrapping, but other materials are now also available. Some method for comparing the relative efficiencies of these materials is often required, and the following has been found to be of value.

It should be borne in mind that we are here concerned with resistance to the passage of water vapour only, and not of water in the liquid state. The wrapping to be examined is used as a diaphragm separating two atmospheres, one of which is at 0 per cent. relative humidity, and the other at 100 per cent. relative humidity. The weight of water vapour passing through the diaphragm is then measured, and for purposes of comparison the results can be calculated as grammes of water vapour

passing through a square metre of diaphragm area in twenty-four hours.

Values thus obtained with a number of wrappings are given in the accompanying table:

RESISTANCE OF WRAPPING MATERIALS TO THE PASSAGE OF WATER VAPOUR

Materials Examined.	*Loss, in Grams per Square Metre, in 24 hours.*
Waxed paper	Down to 10
Waxed paper, after severe creasing ..	90 to 100
Coated viscose film	16 to 20
Viscose film	150 to 190
Coated glascine paper	100 to 156
Glascine paper	280
Vegetable parchment	185 to 320
Kraft papers	200 to 250
M.G. sulphite papers	Up to 480

Of course, no true comparison can be made between such very different materials without taking into consideration the possible effects of differing weights and thicknesses, but the values given will serve as a general indication of values obtainable by this method.

As will be seen, and as might be expected, waxed paper can have a very high resistance to the passage of water vapour. This has, indeed, proved something of a difficulty in bread wrapping, and opportunities for some water vapour to escape have actually had to be provided. This is necessary because of the amount of moisture vapour which is usually being given off by the bread at the time of wrapping. If no means of escape is provided this water condenses on the inside of the wrapping, and ideal conditions for mould growth are thus obtained. Methods for overcoming this difficulty form the subject of many patents, covering such devices as leaving strips of the paper unwaxed, puncturing a series of small holes in the wrapper, and so on.

The reduction of the water vapour passing capacity of viscose film to only one-tenth of its former value by means of a very thin applied coating is a remarkable result. This shows what the coating method can do at its best, but such results are only obtainable with carefully balanced lacquers under controlled conditions. As may be seen from the values given, the coating of glascine papers does not yet appear to have reached a similar state of perfection, at least among the samples so far examined.

Sealing.

A further trouble often experienced in the past with waxed paper was the difficulty of obtaining good adhesion in sealing up packages or making bags. The usual method in which some of the wax is melted and then cooled under pressure gives a seal which is satisfactorily airtight, but which has only very low mechanical strength. This difficulty has now been fairly satisfactorily overcome by the use of suitable adhesives, and bags made from waxed paper have now been on the market for some time.

Choice of Wrapping.

The purpose of this article is to emphasise the obvious importance of the right use of a wrapping material. Accordingly, the selection of the wrapping material to be used should be based firstly on the inherent properties of the wrapping material selected in relation to the properties of the material to be wrapped, secondly on the conditions in which the goods have to be handled between producer and consumer. In actual practice it is generally not feasible to realise this ideal, because price is always the dominant factor: but even when price requirements have been considered it is also often possible to pay at least some attention to these other important considerations, and it is always likely to be advantageous to do so.

Clean Milk

IT has been estimated that at present about three out of every thousand cows in the herds of this country give tuberculous milk. Under the Tuberculosis Order the affected animals must be slaughtered as soon as the trouble is detected. Early diagnosis is not always possible, however, and while cows showing marked signs of udder disease may be observed and reported, it frequently happens that tuberculous udders can only be detected clinically by veterinary surgeons with special experience.

Recently the Council of Agriculture for England has reviewed the progress made in the few counties where a periodical inspection is made of dairy herds by whole-time veterinary officers, from two to four times a year. The Council of Agriculture has pointed out that the policy of cleaning up the milk supply is immeasurably superior as a national policy to one that is heading more and more to total pasteurisation. Milk should be produced clean and sound rather than be produced with less care and have to be pasteurised or sterilised, as some of its character is taken away in the process to make it "safe." Since a regular veterinary staff was instituted in the West Riding of Yorkshire five years ago the increase in the number of cows dealt with under the Tuberculosis Order has been very marked, and now the proportion of acute cases of emaciation has been reduced practically to zero. In the meantime it is interesting to note that in Manchester alone 323 children are infected every year with bovine tuberculosis, and the treatment of this disease costs Manchester about £18,000 per annum.

TRANSPARENT FOILS

The following information has been derived from a German book "Transparentfolien" written by Dr. Marta Halama, and published a few months ago.

By DR. LOUIS LIGHT

IT CANNOT be too strongly emphasised that the transparent wrapping and packing materials, which are now so prominent a feature in the display of manufactured goods, are in no way competitive with ordinary paper. One may sum up the situation by saying that transparent foil begins where ordinary paper leaves off, inasmuch as the cellulose which is the essential constituent of ordinary opaque paper can only be rendered transparent by subjection to a whole series of complicated chemical operations. In the same way, the spheres of application of transparent cellulose are largely distinct from those of ordinary paper. In fact, the function of transparent foil is supplementary to that of its elder brother in the sense that it is employed for the wrapping of goods which were formerly sold and displayed in a more or less naked condition. Ideally fulfilling modern standards of hygiene as applied to the retail display of consumable goods and simultaneously focussing the attention of the passer-by upon the objects within the sparkling wrapper, transparent foil must irresistibly appeal to the manufacturer of foodstuffs, perfumes, cosmetics, confectionery, and the other thousand and one articles on sale in civilised countries.

Although from the users' standpoint there is only one type of transparent cellulose foil—leaving on one side for the time being the gelatine foil which also enjoys a certain measure of popularity—the two varieties now on the market are widely different from the chemical standpoint. These are viscose and cellulose acetate, and it is of interest to obtain some idea of the manufacturing methods involved in the conversion of ordinary cellulose into the attractive transparent forms.

Viscose Manufacture.

When wood pulp is treated with caustic soda and the resulting alkali cellulose brought into contact with carbon bisulphide, a further chemical reaction takes place with formation of sodium cellulose xanthogenate, a viscous orange-yellow material which is a complex cellulosic compound in which sulphur is present in the molecule. Passage through a series of baths—coagulation, deacidification, desulphurisation, etc.—ends in the formation of "regenerated cellulose." Chemically speaking, the latter consists essentially of pure *alpha*-cellulose purified from the alkali-soluble *beta*- and *gamma*-celluloses which are eliminated during alkalisation. In actual practice, the sulphite wood pulp obtained from spruce trees has proved most satisfactory for conversion into regenerated cellulose, both for the artificial silk and transparent foil trades. It might be mentioned incidentally that viscose rayon (artificial silk) and viscose transparent foil are fundamentally identical in chemical composition.

Spruce pulp is treated with 18 per cent. caustic soda solution, and the resulting alkali cellulose is allowed to mature for a time before being converted into sodium cellulose xanthate in a drum where the matured alkali cellulose is stirred with carbon bisulphide. The remarkable change into the deep orange-yellow xanthate or viscose (which was first turned to account by Cross and Bevan at the close of the nineteenth century) takes place in 2 to 3 hours, but the substance at that stage has to undergo a long and carefully controlled series of treatments before it emerges as regenerated cellulose.

The initial step in transparent foil formation is one of coagulation of the viscose; this takes place on a metal support, as illustrated in Fig. 1 in the case of the latest process. As the drum (C) revolves in the bath, the viscose coagulates thereon and is transferred via the rollers D, E1, and E2 into the after-treatment baths. Fig. 2 shows an alternative and older method. The viscose sheet which begins to coagulate after issuing through the slit B is caught below the surface by the roller C1 and then travels in coil formation in succession over the rolls numbered from C2 to C9. Issuing from the bath, the coagulated film is passed through roller C9 and the superposed roller D and then proceeds to the after-treatment baths.

Cellulose Acetate Transparent Foil.

Both from the manufacturing standpoint and that of composition the cellulose acetate foil differs widely from

viscose. Whereas cellulose acetate is obtained in the form of a white powder of remarkable stability which can be stored for an indefinite period and is reasonably fire-resistant, the success and indeed the practicability of viscose foil manufacture depends upon continuity of operation from the alkalisation (mercerisation) of the wood pulp right through to the final drying of the transparent sheet. Far greater elasticity is thus possessed by the cellulose acetate foil manufacturing process.

As, unlike the viscose process, no coagulating or after-treatment baths are required, the foil-forming process is enormously simplified in the case of cellulose acetate. Here an acetone-alcohol solution is poured on to a broad metal band of copper or bronze construction, 50 feet or more in length. To a certain extent the problem of manufacturing faultless cellulose acetate films had been solved by the non-inflammable cinema film industry before acetate wrapping foil came on the scene. Great technical difficulties nevertheless had to be overcome before uniform sheets of 2 to 3 feet in width and possessing only a fraction of the thickness of cinema film could be turned out.

In spite of the relative simplicity of cellulose acetate foil manufacture, it does not in the long run offer any economic advantage over the viscose method, as the lower installation costs of the acetate plant are offset by the high prices of some of the raw materials, glacial acetic acid, acetic anhydride, and acetone. In fact, the process can only be worked at a profit by arranging for more or less complete recovery of the acetic acid in the acetylating bath and of the solvents evaporated in the foiling plant. By contrast, the viscose process enjoys the use of considerably cheaper raw materials in the shape of caustic soda and carbon bisulphide.

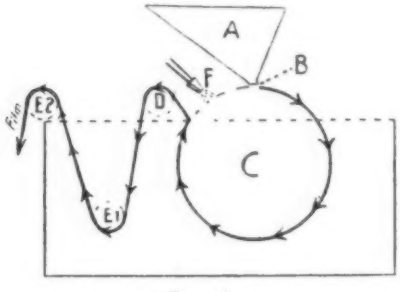


FIG. 1.

Gelatine Transparent Foil Manufacture.

Thanks to its cheapness and simplicity of manufacture, gelatine foil is a popular wrapping material, particularly in connection with the internal packing of chocolate. Relatively poor moisture resistance and mechanical properties handicap gelatine foil in many departments in which viscose and cellulose acetate are more satisfactory. Where the wrapped article, for example, possesses sharp corners, the gelatine foil may rupture.

From the technical standpoint, gelatine foil manufacture possesses the further advantage of not requiring a material of the high degree of purity necessarily demanded of gelatine intended for the manufacture of

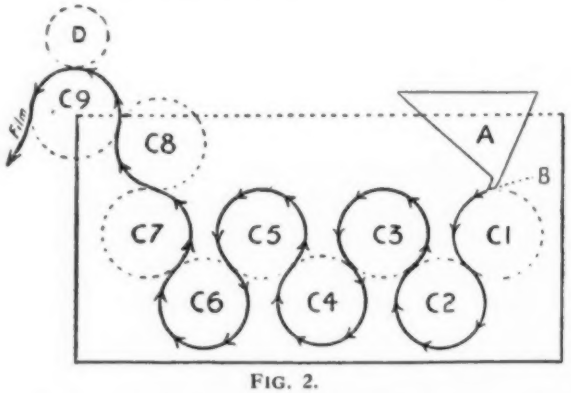


FIG. 2.

foodstuffs and pharmaceutical preparations. The process is nevertheless of a somewhat protracted nature, for several weeks may be occupied in the preliminary refining of the bones, calves' feet, horns, etc., by alkaline treatment.

Gelatine foil must under all circumstances be hardened by formaldehyde treatment so as to decrease the sensitivity to water of the natural product. Even then it is quite unsuitable for the wrapping of hygroscopic foodstuffs, although a certain degree of success has attended efforts to render gelatine foil impermeable to moisture by coating, as in the case of cellophane with a cellulose lacquer. Apart from its cheapness, strong points in favour of gelatine foil are greaseproofness, moulding qualities, and impermeability to odours or flavours.

Simple Distinguishing Tests.

Owing to their profound chemical dissimilarity the user of transparent wrappings will have no difficulty in distinguishing between the two forms. It must be said at this point, however, that no striking differences in quality are exhibited by the two types for the majority of purposes, the original inferiority of viscose foil in respect of resistance to moisture absorption having recently been rectified. Both viscose and acetate foils are now recognised as being equally efficient in respect of appearance, mechanical strength, and ability to protect wrapped foodstuffs against access of moisture from the environment or against reduction in freshness by loss of vital volatile ingredients. There are certain special spheres, however, in which one or other of the two types of foil may be preferable, in which cases the following simple tests should furnish a rapid means of identification.

(*a*) *Burning Test.*—Whereas viscose burns slowly with

a small flame and chars without any smell being developed, an acetate foil begins to melt in the course of its slow combustion, and the hard, brittle residue gives off a smell of acetic acid. The smell of burning gelatine reminds one of charred bones and other animal products, and the flame is only short-lived.

(*b*) *Solubility Test.*—On immersion in water, viscose undergoes a rather considerable absorption of liquid, but practically no change occurs in the case of acetate. On the other hand, on immersion in acetone or glacial acetic acid no solution is effected in the case of viscose, but the acetate rapidly goes into solution. Gelatine is completely soluble in water if not previously hardened.

Applications of Transparent Foils.

As mentioned at the outset, an entirely new sphere for the manufacturer of wrappings has been opened up by the growth of a desire on the part of present-day manufacturers to display their products in a manner which not only attracts the prospective buyer, but also possesses hygienic advantages. In all cases, of course, transparent wrappings can be used to advantage for the purpose of preventing deterioration of goods in open display which

would otherwise be exposed to the insidious effects of a dusty and humid atmosphere.

While a powerful incentive towards the adoption of transparent wrappings is almost invariably the desire to stimulate the attention of the potential customer, the food industry should be particularly interested from the additional angles of protection against contamination from outside and the preservation of freshness in respect of aroma, flavour, and appearance. In other words, the transparent but vapour- and moisture-proof wrapping ensures delivery of all types of foodstuffs to the public in the factory-fresh condition.

Properties of Cellulose Foils.

Unique features of transparent cellulose foils, whether in the form of viscose (*e.g.*, cellophane) or cellulose acetate, are toughness, glass-clearness, indifference to boiling water, grease-, oil-, and petrol-resistance and

reasonably low inflammability. Leaving on one side for the moment the attractiveness of the smooth, glossy surface, these qualities alone justify the growing popularity of transparent wrappings. In view, however, of the comparatively wide limits within which the properties of the foil can be varied as a result of modifications in the manufacturing or finishing stages, it is advisable for the user to have some rapid means of assessing the main physical characteristics of any given consignment delivered to the factory.

As will be gathered in the course of the following outline of the principal testing methods, many of the devices are identical with those long employed in the paper trade, while others, such as methods for gauging the transparency to light rays, are more novel in character.

Tensile Strength.—Transparent foils are naturally expected to withstand considerable tearing stresses. A curious distinction here exists between viscose and cellulose acetate, the former being stronger in the direction of length than in that of width, whereas acetate is equally tough in both directions. In the case of viscose the variation has its origin in the gradual shrinkage and longitudinal tension which endless viscose band undergoes throughout the course of manufacture. Cellulose acetate, on the other hand, is obtained in foil form by simple evaporation of a solution on a metal support.

The apparatus for estimating tearing strength is similar to that employed for textiles and paper, pieces of the foil of definite length and width being fixed between clamps in the apparatus and brought to the tearing point by downward movement of the lower clamp. By means of a pointer, one can directly read off the tearing strength in

kilograms. Supplementary to this estimation is the determination of tensile bending strength, which provides valuable information as to the probable behaviour of the transparent material when made up into packages with sharp edges. This apparatus is diagrammatically illustrated in Fig. 3. A metal strip of specified thickness and rectangular cross-section is fixed to the upper clamp of a standard tearing strength tester in such a way that the section of the strip is exactly at right angles to the axis of tearing. A cellulose foil (15 mm. width) is attached to the metal strip and both ends are secured in the lower clamp. In this way a sort of hoop is formed, located above the partially rounded bending edges. The load is gradually increased in the manner described above until the strip ruptures. The limiting figure obtained can therefore also form a guide to the brittleness of the material.

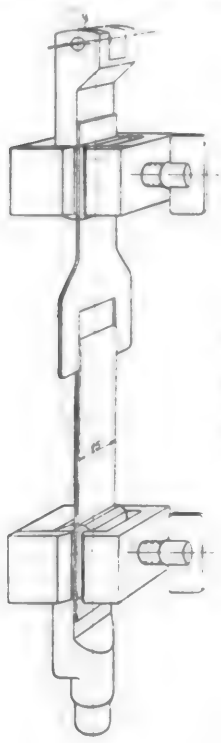


FIG. 3.

Apparatus for the Determination of Tensile Bending Strength.

Elongation.—Tearing strength and elongation are proportional to one another, and an increase in tearing strength leads to improved elongation. Whereas, however, the tearing strength of viscose is greatest in the direction of length, the exact reverse holds good in the case of elongation, the longitudinal elongation being sometimes 50 per cent. less than that in the direction of the width. This phenomenon is only manifested by viscose foils. Special treatment enables the elongation of viscose to be increased to 30 per cent. or more, but the maximum figure in the case of acetate lies round about 20 per cent. The estimation is carried out with the same apparatus (Fig. 3), observations being made of the change in the distance between the two clamps under given load, the percentage elongation being directly read off from the scale.

Bursting Strength.—It is obvious that a container of transparent cellulose material should be capable of yielding to a reasonable extent under the pressure of the contents. Several types of apparatus are available for determination of this property. In one the test is carried out by pressing spheres of gradually increasing diameter against the sample until bursting takes place. A rather more complicated machine is Schopper's tester, in which the sample of transparent foil stretched across the open end of a cylinder is exposed to a stream of compressed air

of gradually increasing pressure. The bursting strength is expressed in kilograms per square centimetre. A close connection naturally exists between elongation, tensile strength, and bursting strength, so that estimation of the latter property provides valuable information as to the all-round quality of the sample.

Folding Strength.—Transparent cellulose wrapping material is subjected to severe treatment of a folding nature, and valuable data on this point can be obtained with the aid of the folding resistance tester, which is extensively used in the paper industry. A strip of the foil secured between springs is exposed to a nicking action over a slotted metal strip until breakage at the fold takes place. The strength is expressed in terms of the number of folding movements to which the foil is subjected before it cracks.

Permeability to Air.—This is one of the properties of

supreme importance from the food manufacturer's standpoint, since upon the efficiency of the foil in this respect largely depends the effectiveness of its preservative qualities for foodstuffs. No special apparatus, however, is required, since the gas-permeability of such foils can be deduced with the aid of apparatus already in established use for determination of this quality in the case of rubber tyres. Circular pieces of the foil are stamped out and firmly inserted in the apparatus, experiments being usually carried out with the aid of hydrogen; the amount of gas which diffuses through the foil within a given time is usually indicated by an automatic arrangement.

An alternative method measures the volume of air sucked through the foil in a given period at a given reduced pressure. Transparent foil differs from ordinary paper in being non-fibrous and free from pores, therefore exhibiting a much greater degree of impermeability.

Light Transmission. — Special applications of transparent foils demand a knowledge of the degree to which they transmit different light rays, the information being exceptionally important in respect of ultra-violet light.

Transparency to light rays can be estimated with the aid of the half shadow photometer equipped with two variable grey wedges. After adjusting the apparatus to the null position for incident light with the aid of a sheet of opal glass, the sample is inserted and a determination made of any alteration in brightness, the deviation from the null position forming a measure of the transparency to light waves. The product is more suitable the less the degree of deviation. Transparency to ultra-violet light is determined by means of the quartz spectrograph and exact determinations have here revealed excellent properties. Attention may also be drawn to the diaphanometer method (already in use in the paper industry), which is well adapted to the measurement of the transparencies of transparent foils. The method consists in principle in superposing a gradually increasing number of foils on to a sheet of printed matter until the words are no longer legible.

Permeability to Water.—Although viscose foils are more hygroscopic than acetate, they are, nevertheless, only slightly permeable to water. Information as to the quality of a particular foil on this score can be very easily obtained by firmly attaching a sheet of the material to the open end of a glass cylinder which is filled with water. If the pressure of the water columns forces liquid through the foil, observation must be made of the quantity which penetrates in a given time. Any objection to viscose foils which might formerly have been justified on account of its original sensitivity to water vapour is now nullified by the modern weatherproof viscose foils which have been coated with a thin layer of a cellulose ester lacquer.

Permeability to Grease.—This is another factor of great importance in the packing of foodstuffs and confectionery. A simple way of judging the quality of a submitted sample consists in applying a gradually increasing load to a specified quantity of lard inserted between two sheets of the sample, observations being carried out at definite intervals to determine if traces of fat penetrate the paper. Transparent cellulose foils are generally recognised as possessing unusually good greaseproof quality.

Data on Physical Properties.

Dr. Halama gives the results of tests on tensile strength, elongation, etc. In order to give the reader some idea of the numerical values of the more important of these properties, we quote below the average of Dr. Halama's figures.

	Viscose Foil.		*Acetate Foil.*	
	Length.	*Width.*	*Length.*	*Width.*
Tensile strength ...	3·96 kg.	3·02 kg.	2·67 kg.	2·81 kg.
Elongation	15·4 %	26·9 %	17·4 %	17·6 %
Folding strength ...	7.287	5.112	131	105
Bursting strength ...	2·39 kg./sq. cm.		1·80 kg./sq. cm.	
Permeability to air ... Area 10 sq. cm. Pressure 10 cm. water	11 c.cm./hour		9·3 c.cm./hour	

PACKING FOOD PRODUCTS IN CARTONS

By Miss C. M. Knight, M.Sc.

New Materials.

SINCE THE cardboard carton has become part of the recognised packing for food products, it must be a matter of some interest to those producing and packing such things to get some idea of the preparation of these packages from their raw materials, and to be aware from such knowledge of the possible sources of trouble which may arise with regard to the material or the finished carton.

Much time has been spent in designing packages, in making the most convenient shapes for handling, packing, and displaying purposes, as well as the special attention of artists, which has been given to each individual package. It is the object of this article to discuss the raw materials from which the carton is made, and the way in which they affect its suitability for use apart from design.

The chief material is, of course, cardboard, which may be divided into three groups, covering all possible varieties used in preparing folding and set-up boxes used for food packing. The classes are:

1. Dutch strawboard.
2. Continental and Canadian boards made from new pulp.
3. British and Continental boards, in which waste material is used in conjunction with the fresh pulp.

Strawboard.

Dutch strawboards may often be prepared from anything but straw. A considerable amount of waste is used in their manufacture, especially in the cheaper grades, and the pulp is prepared by boiling with lime. The resulting brown-coloured board often contains a large proportion of alkali. This board is, of course, rarely used without a lining on one or both sides, but even then, if damp is allowed to get at the carton, the brown colour may penetrate the lining, producing discoloration of the paper, and also the alkali is capable of having very harmful effects on printing inks unless they have been chosen to be alkali resisting, which rather limits the variety of colours while adding to the cost.

The chief physical characteristic of strawboard is its stiffness, which together with its low price makes it a popular material for set-up boxes. Very little is now used for cartons, owing to its liability to fracture when folded.

New Pulp Boards.

The second class is put down wholly as Continental and Canadian because the only place where fresh woodpulp can be obtained in sufficiently large quantities, and at reasonable enough prices, is in those districts where the wood itself is obtained, such as Sweden, Finland, Germany, and Canada. Such boards are to be highly recommended for packing foodstuffs because of the degree of purity which can be maintained with very little trouble.

These countries have a plentiful supply of clean water in the rivers and lakes, and the trees fresh from the forest are barked and ground to form the various kinds of pulp. The back of a great many of these boards, which is the part most likely to come into contact with the food, consists of nothing but ground or mechanical woodpulp, which, of course, contains no impurities except such minerals as are natural to the wood.

The white liner in this case is made generally from sulphite pulp, which is prepared from the wood by treatment with a solution of calcium bisulphite with steam under pressure. As a result of this the ligneous properties of the wood are destroyed, and the fibres of cellulose are left behind. In order to produce a good white colour, the sulphite pulp, as it is then called, may be bleached with chlorine. Any of this which may remain after the bleaching is complete is destroyed by the use of an antichlor. Small amounts of these substances may be left in the pulp, but the greater part will be washed away.

The only chemicals which are added in the actual manufacture of the board are rosin soap and alum, which size it. It can be seen, therefore, that such boards are likely to be very clean and free from impurities which might be injurious to food. A further advantage of these boards is their extremely good appearance, which is very important when packing food. If the bleached pulp has been used for the surface the white colour will be fairly fast to light, thus preserving the appearance of the carton, even though it may be required to stand in an exposed position in a window for some days.

A Popular Board for Carton Making.

We now come to the third class of board, in which part of the raw material is fresh pulp, sulphite, or mechanical wood, and part is waste paper and board which is pulped up again. The outside is usually made from the fresh material, while the back is made of waste and fresh pulp in varying proportions. In some cases an inside liner of fresh material is added, with a layer of waste in the middle. This use of waste has its advantages. Firstly, it considerably cuts down the cost, and, secondly, it produces a softer board than those with the woodpulp backs, having usually a higher bursting strength with good bending qualities. This makes these boards most popular for cartons, providing the board is sufficiently free from chloride and other chemical impurities.

If the waste is only used for the middle, the appearance of the board may be as fresh as that manufactured from new pulp, but it is with the introduction of this waste that the food packer should be on the alert for dangerous amounts of mineral impurities which may seriously affect the contents if they are allowed to remain in contact with it.

Precautions Worth Observing.

If a carton is to be used for an article which would be seriously affected by the presence of acid (for example, eggs) alkali, or chloride, the carton maker should be required to guarantee that the material is so free from these ingredients that insufficient is present to attack the contents.

One of the chief difficulties in using cardboard containers is that they are not moisture-proof. Several methods have been adopted by which the penetration of moisture can be resisted. The board used for cartons containing cheese and dried fruit is often coated with wax on one or both sides. This prevents the moisture passing through the board itself, but still leaves the fastenings and glued flaps as a possible source of trouble. A wax paper liner or wrapper may supplement the board, making it quite moisture-tight until it has been opened once; after that, of course, there is no means of resealing the carton effectively.

Cardboards have also been lined together with a bituminous compound, the results being very much the same. Moisture-proof regenerated cellulose paper is also useful for an outer wrapping where extra transparency is required.

Choice of Printing Inks.

The other important material in carton making is the printing ink used. An important factor from the food packer's point of view is that the ink should not leave an unpleasant odour in the carton, which might affect the contents, so that the box maker should be requested to use special care in this matter.

Black ink is quite safe, as it is prepared almost entirely from linseed oil and pure carbon black, with possibly a small proportion of toner in the form of an aniline dye. The colour pigments should, however, be viewed more carefully. For instance, green ink may be prepared from pigments containing arsenic, and, if this is to be the chosen colour, specification asking for an arsenic-free ink should be made. Arsenic is also a possible impurity in bronze powder, and, as this is often very easily rubbed off, unless the food contents are protected by an inner wrapping such ink should not be used.

Many inks are also made on a lead base. A base such as alumina is much to be preferred in printing food

Testing the Bursting Strength of a Finished Carton.

cartons, as the lead may get into the food. Although in using a more expensive base the ink bill may be a trifle higher, the increase in the cost will be negligible when compared to the cost of the finished cartons, and the additional safety will be well worth it.

In presenting food to the public in cartons, as with any other product, an attractive outside is a definite sales factor, and, therefore, although the following remarks may have no direct bearing on the contents of the carton, they may be useful from the advertising point of view.

Colour Fastness.

No colour can be guaranteed perfectly fast to light; there is bound to be some effect of light on the pigment or dye. A number of mineral colours may be considered fast for the average life of a carton, or even longer. Bronze blue and Prussian blue are, perhaps, the best examples of such a colour. Chrome yellows are also very lasting, but it must be remembered they are lead pig-

ments. A number of red dyes can be obtained which will show a good resistance to light except when very much reduced. Violets, bright peacock blues, and some greens are very fugitive, and if such colours are desired special precautions should be taken to see that the ink is as fast as it can possibly be obtained.

It is advisable to test all inks with the aid of a Fade Outfit, using a powerful carbon arc if the result is required immediately. A more exact idea of the fastness will be obtained if time can be afforded to place the sample in a south window for a period of two or three weeks, since that is usually the maximum time for a display.

Tests for Bursting Strength of Boards.

Finally, it seems necessary to discuss the strength of the board and carton. It is obvious to those who pack any kind of powder that a board cracking along the edges

The Mullen Tester.

is rapidly going to burst and spill the contents, so that for the folding cartons the creasing properties of the board must be determined. The actual bursting strength of the board, measured by means of a Mullen tester, is a good measure of its strength where the board must stand up to a high pressure from the inside. This is insufficient to show the rigidity of boards, so that if many are packed one above the other, unless held rigidly by the contents, there is a tendency for the sides to bulge out.

It is possible for these three properties to be measured before the carton is made, so that strong, neat creases can be guaranteed. A sufficiently high bursting strength can also be found, and a board stiff enough to protect the contents without damage. This stiffness is very essential in cartons for packing fancy cakes and pastries, etc., where the contents are very fragile.

Tests can also be made on the finished cartons, showing just what pressure the creases will stand without bursting, by using a Mullen tester or Tensile Strength tester on the crease, and also the pressure that the outside of the box will stand before collapse.

Glucose Propaganda

WHAT appears to be a very well thought out campaign has been organised by the Corn Products Co., Ltd., to commence about the third week of this month. It has been called by them "a national propaganda campaign to make known the merits of glucose and to familiarise the public with the glucose mark." The latter, which we reproduce herewith, is certainly rather striking, and,

GLUCOSE
LIFES
VITAL
FORCE

together with such publicity features as a *Daily Mail* front page and other newspaper advertising, extensive circularising to retail confectioners, and a newspaper article by Sir Wm. Arbuthnot Lane, should go far to increase the sales of glucose and give definite impetus to the demand for "glucose mark" confectionery. Many manufacturers have already incorporated the glucose seal in their labelling.

Orange Juice

IN connection with the article on citrus juices by Professor Cruess, which we published in December, it is interesting to note the views of B. C. Coons on the manufacture of orange juice which recently appeared in an American contemporary.

Mr. Coons' description of a satisfactory product is "the actual juice from ripe oranges containing from 5 to 10 per cent of the juice-cell pulp, without any of the undesirable solids in it." The careful choice of varieties for blending is important. Many people do not realise that there is a considerable difference between the flavour imparted by juice-cell pulp and rag pulp. Both rag and rag juice will quickly ruin the flavour of orange juice after extraction. Chemists appear to have given more attention to the elimination of enzymes or their destruction than they have to the elimination of the undesirable flavours and solids.

When juice is prepared in a manner which ensures the absence of seeds, seed flavours, oil of orange, rag juice or ground rag, by means of special equipment, and at a temperature of 10° F., it can be filled into paper cups, glass jugs, or enamelled tin cans and frozen successfully.

ICINGS

A Note on their Manufacture by
R. Harold Morgan, B.Sc., A.I.C.

THE ATTRACTIVENESS of cakes, fancies, etc., is considerably increased when these goods are decorated with suitable icings. There are several recipes for this form of decoration, and they can be varied according to the requirements of the manufacturer as to cost, keeping qualities, finish, etc. For this reason it is intended in this article to give only the bases of various recipes which can be modified as required.

Water Icing.

The cheapest form of icing is water icing, which is a well-beaten mixture of pulverised sugar and warm water. The addition of a little citric acid helps to keep the icing soft. On a large scale the mixing can be carried out in a sponge mixer. A better result can be obtained by warming about 6 lb. icing sugar with 1 pint of syrup (10 lb. sugar per gallon of water) and beating them well together. A little glucose or acid will aid in giving a smoother paste which will keep soft longer.

A strong solution of sugar in water has a great tendency to form crystals, preferably of a large size, which results in an icing which is gritty to the taste. The addition of glucose retards this crystallisation, as it contains dextrins or gum-like substances which coat the small crystals and prevent them from increasing in size. The addition of acid has a similar effect with regard to delaying crystallisation, but acts in a different manner. The acid breaks down some of the sugar into invert sugar, which is a mixture of dextrose and levulose. The latter does not crystallise easily and inhibits the crystallisation of sugars with which it is mixed. Levulose has a further advantage in that it attracts moisture and so keeps the icing soft. Invert sugar now can be purchased on the market, and it is preferable to add it direct instead of introducing it by acid inversion, which is liable to give varying results. Water icing has a short shelf life, as it dries out rapidly and becomes rough, which affects the appearance of the goods.

Royal Icing.

The most popular form of icing is Royal Icing or Glacé Royal. This icing has a satisfactory gloss and sets so hard that breakages during transport are rare. It is made from egg whites, icing sugar, blue, and acid. Large quantities can be prepared in the sponge machine, adding two-thirds of the sugar first and one-third when in the icing bowl.

The proportions used are 7 lb. sugar to each pint of egg whites (3 whites per lb.). Two-thirds of the sugar is placed in the pan and mixed thoroughly with the whites. A spot of ultramarine blue is added to throw out the whiteness of the mix and a few drops of acetic acid. The latter dissolves the colouring and helps to toughen the albumen. The mixture is beaten until the sugar stands upright when the paddle or spoon is withdrawn. The remainder of the sugar is stirred in and the mixture covered with a damp cloth or a plaster of Paris cover soaked in water to prevent a skin being formed on the surface of the icing as a result of drying out.

The hardness of royal icing is a disadvantage from the average consumer's point of view. In the manufacture care must be taken not to add too much acid, as this hardens the albumen. The addition of glycerine helps to soften the product and to keep it moist. The above will require about half a gill.

Addition of Fondant.

A more mellow icing which eats softer and yet retains its firmness and gloss can be made by adding some invert sugar or fondant to the royal icing.

The fondant can be made by machine or hand (see FOOD MANUFACTURE, November, 1932). It is carefully melted in the usual way and mixed with the prepared icing. The proportion of fondant to icing is a matter of opinion; one part of fondant to two parts of royal icing gives a good result.

Various other pastes are also used for icing and decorative work. Meringue pastes can be made by adding boiled sugar to beaten whites. A little condensed milk lightens the product.

Gum pastes for modelling consist of starch, icing sugar, and powdered gum tragacanth.

New Canning Machinery

WE found much of interest at the exhibition of canning machinery constructed by the Lazenby and Ridgwell Canning Machinery Co., Ltd., recently held at the Croydon Aerodrome. What interested us particularly were: (1) A pea shelling machine fitted with an apron made up of overlapping aluminium plates automatically kept clean by brushes. We consider that the design of this machine is excellent. (2) An asparagus cutting machine delivering each length separately. (3) A vegetable dicing machine of ingenious construction. (4) A bean cutting machine. Besides these were displayed picking, sorting, and grading machines for fruits and vegetables, a labelling machine, an automatic can code-marking machine, a disc-type exhaust box, a round exhauster, and a shelled pea washing machine. In addition, this firm supplies fruit stoning and cherry pitting machines, syrupers and fillers, blanchers, fruit and vegetable cleaning machines, and other items of equipment for the cannery—especially the vegetable cannery.

BOTTLE CLEANSING

A Discussion of Modern Views

THE CLEANSING of bottles used in the beverage, dairy, and other industries has made great progress with the advent of the automatic bottle washing machine.

Some twenty to twenty-five years ago bottles were mostly cleaned by means of soaking and brushing, either by hand or machine. To-day in all but small establishments bottle washing machines are used. These consist of two general types known respectively as the hydro type and the soaker type. In the hydro type the washing solution is sprayed under pressure on to and into the bottles, whereas in the soaker type the bottles are only conveyed through a still solution of alkali, followed in each case by final rinsing.

Some soaker machines have only one solution tank, while other machines have as many as eight tanks. Naturally, it takes a much stronger solution of alkali to wash bottles in the soaker type of machine than it does in the hydro type.

There are machines which include both these general principles, the bottles being not only soaked in but also sprayed with a hot alkali solution before the final rinse.

Simultaneously with these mechanical improvements there has taken place a more scientific compounding of cleaning materials as knowledge of the action and properties of their various ingredients has been accumulated. At the same time, it cannot be said that this knowledge has advanced to the point of unanimous agreement among those who have studied and gained experience in this complex and difficult department of applied science. One notes considerable divergence of opinion expressed by these authorities, a fact which should be kept constantly in mind. In the following article we shall attempt to give an unprejudiced statement of views commonly held.

Washing agents may be conveniently considered as falling into four general classes:

Sodium Carbonates.
Tri-sodium Phosphate.
Caustic Soda.
Soap.

These may be employed singly or, as is usual nowadays, compounded into various proprietary preparations, possibly with the addition of other ingredients, some of which are mentioned later. The following particulars are useful:

Chemical Name.	*Trade Name.*	*Formula.*	*pH Value in N/10 Solution at 25° C.*
Sodium sesquicarbonate	Modified soda	$Na_2CO_3.NaHCO_3.2H_2O$	9·6
Sodium carbonate	Soda ash	Na_2CO_3	11·0
Sodium carbonate deca hydrate	Sal-soda	$Na_2CO_3.10H_2O$	11·6
Tri-sodium phosphate	T.S.P.	$Na_3PO_4.12H_2O$	12·2
Sodium hydroxide	Caustic soda	NaOH	13·0

There appears to be much confusion and variation in opinion as to what constitutes the ideal mixture. This is not surprising when one considers the variety in the nature of the dirt which detergents are called upon to remove and also the variety of conditions under which washing is carried out. Moreover, their function is not a simple one, in that several considerations arise simultaneously, such as:

Water Softening.
Washing.
Emulsification.
Ease of Rinsing.
Germicidal Action.
Action on Metals.
Solubility in Water.
Action on Labels.

Since each alkali mentioned above behaves differently in respect of the various factors enumerated and since little is known of the precise mechanism of action, it is obvious that the compounding of detergents is a matter which is largely based on experience. It is essentially a problem of making a judicious selection of the alkaline ingredients and blending them in the proportions which experiment and experience have shown to give the best results under specified practical conditions. One has to make a compromise in regard to their detergent properties, since no one alkali possesses all these properties in the highest degree. Furthermore, there is some difference in opinion in regard to the detergent properties possessed by the various ingredients commonly used in compounding washing materials for bottles and similar articles. We do not propose to enter here into this discussion. By way of example it is instructive to cite views expressed by Frandsen, Phillip, and Mack, of Massachusetts, at the International Dairy Congress (1931) at Copenhagen, who made an examination of various washing powders on the market. These they found fell into four general classes, containing sodium carbonate, caustic soda, tri-sodium phosphate, and soap respectively.

Sodium carbonate has very good softening power, greatly aids washing mechanism, is a poor emulsifying agent, rinses very easily, has slow action on tin and very mild action on hands, and neutralises odour.

Sodium hydroxide is a poor water softener, with good washing power and poor emulsifying effect. It is very difficult to rinse, acts on metals, has a severe action on hands, is a strong caustic, and will pit cans.

Tri-sodium phosphate is an excellent water softener, with poor washing power and excellent emulsifying pro-

perties. It is easy to rinse (which is disputed by other authorities), has very mild action on metals and hands, is a good solvent for casein, and gives buffer effect which keeps caustic strength uniform.

Soap has poor softening power, poor washing power, and excellent emulsifying properties. It is hard to rinse, has mild action on metals and hands, and is apt to leave scum in bottles.

Other ingredients are often added for specific purposes. Hypochlorites are added in some instances because of their germicidal action. Sulphates are occasionally added, but have no desirable qualities. Silicates of some metals are added to render protection to the machinery parts in contact with the solution. Sodium zincate and aluminate are sometimes added for protection of zinc and aluminium parts respectively. Resinates and gums are also occasionally found in the powders, and are usually added to protect copper fittings. Grit is added to some to clean metals. Borax, although not often found, has certain advantages of emulsification and disinfecting powers. The corrosion of tin-plated metals has practically been eliminated by treating tri-sodium phosphate with a small amount of sodium chromate, and the corrosion of aluminium products has been prevented by treating sodium carbonate with a small amount of sodium silicate.

Tri-Sodium Phosphate.

Thus it may be seen that no one ingredient is a perfect washing compound of itself, and for efficient washing a mixture should be used. The authors stated that a satisfactory powder should analyse approximately 60 per cent. sodium carbonate and 40 per cent. tri-sodium phosphate. On the other hand, many authorities do not agree that tri-sodium phosphate is a desirable ingredient in washing agents, particularly as applied to the dairy and brewing industries, although under some circumstances it is a useful acid in removing mineral greases and oils. The objection raised is that when tri-sodium phosphate is dissolved in water it breaks down to form di-sodium phosphate and caustic soda, and thus exhibits all the undesirable properties of ordinary caustic soda. It is for this reason that tri-sodium phosphate is a good water softener; the di-sodium phosphate acts upon the permanent hardness and the caustic soda overcomes the temporary hardness. Furthermore, tri-sodium phosphate is a very difficult rinser, particularly so as the film left on the glass is deceptive in that it is colourless and glossy, imparting a sparkle to the glass. It is held that the film remains untouched by unrinsed caustic soda and some types of soap, and that it provides a medium for the development of undesirable bacteria.

Effectiveness of Ingredients.

Summarising their practical tests, Frandsen, Phillip, and Mack placed the main ingredients of washing agents in the following order of effectiveness:

Water Softening Powers.—Carbonate, phosphate, soap, hydroxide.

Washing powers.—Carbonate, hydroxide, soap, phosphate.

Emulsifying Powers.—Soap, phosphate, carbonate, hydroxide.

Ease of Rinsing.—Carbonate, phosphate, soap, hydroxide.

Action on Metals.—Hydroxide attacks aluminium, copper, and tin. Carbonate attacks aluminium, copper, and tin. Phosphate attacks aluminium.

Disinfecting Values.—All agents in strength ordinarily employed act as disinfectants to such a degree as to make the washing solution sterile.

As regards disinfecting value, Sherman and Myers of Cornell University, in 1926, and M. E. Parker of New Jersey, in 1927, have fully investigated the germicidal properties of alkaline washing compounds in relation to *p*H.

Tests.

In attempting to gain some concrete idea of what is signified by the above-mentioned properties, one may usefully quote the tests employed by Frandsen, Phillips, and Mack:

The *strength of solutions* employed in these tests was standard 0·6 per cent. based on the dry powder. This was found to be the average concentration recommended by the various manufacturers. A few recommend a weaker or stronger solution, but in order to study the efficiency of the powders a standard had to be adopted. This concentration corresponds to 5 lb. of powder to 100 gal. of water.

The *water softening power* of the powders was determined by treating 100 c.c. portions of the samples with 50 c.c. quantities of standard hard water and then adding standard soap solution until permanent bubbles appeared.

The *washing power* of the powders was determined by tests on uniformly dirty bottles. Five cubic centimetre quantities of milk were run into bottles and allowed to dry. While drying, the bottles were occasionally tilted and rotated so as to wet the sides. The action of 100 c.c. amounts of the cleaning solutions upon these dirty bottles was then observed.

The *emulsifying power* was tested by shaking a 100 c.c. portion of the powder solution with 1 c.c. of butterfat, the whole contained in a tall cylinder. The degree of emulsification was determined by the whiteness of the emulsion and by the length of time the emulsion persisted.

The *ease of rinsing* of each solution was tested by moistening the fingers with the solution and then counting the number of half seconds the slippery feel lasted while the fingers were held under a flow of water and gently rubbed twice per second. The flow was from a faucet and was regulated to give a stream $\frac{1}{4}$ inch in diameter. This test was found to be satisfactory and gave consistent and reproducible results. The average time of three experiments was taken in each case.

Tests based upon the determination of surface tension or interfacial tension appear not entirely satisfactory. Such tests show wetting power, but this is not necessarily

vitally connected with detergent action. The cleaning compound must wet the dirt surface, but it must do more than this. It must have the powers of emulsification and deflocculation.

Dairy Cleaning.

At this point attention may be drawn to the necessity for extreme cleanliness where dairy plant and utensils are concerned, and it is in this field that washing agents play a particularly important part. The tinned or other surfaces with which milk or cream comes in contact must always be thoroughly clean and sterile in order to prevent bacterial contamination. Thus a washing agent must do its work thoroughly, but, at the same time, it must not have any harmful or corroding effect upon the surface of the equipment under treatment. Furthermore, it must be an efficient butterfat emulsifier and casein solvent in order to remove thoroughly the film left by the fat and the milk serum. It must be a free and easy rinser because it is just as important to rinse freely as it is to wash properly in the first place, otherwise one would be substituting one type of dirt for another. Also, it must be harmless to the hands, brushes, etc., which are used in the washing operation; and, finally, it should be reasonably economical from the point of view of cost, although the cost of the cleaning material is, in fact, only a very small fraction of the cost of cleaning as a whole, including steam, water, labour, etc.

Chemical Changes in Cleaning.

Milk and the products manufactured from milk are of a very complex physico-chemical nature. In the handling of dairy products we are dealing with a very delicately balanced system of emulsions, colloids, and solutions which, even when unaltered by any treatment, possess great adhesive properties for surfaces with which they come in contact. When the products are altered by intrinsic agencies such as souring or by outside agencies such as heat, then the original systems of emulsions and colloids are changed and the solid and liquid materials thus thrown out are found to adhere even more tenaciously, and the difficulties of the cleaning operation are therefore greatly increased. The problem in cleaning is, then, to re-emulsify these deposits or bring them back into the colloidal state.

The fat or oily ingredients in dairy products can be separated from the surface to which they adhere by the action of some emulsifying agent provided they are not bound there by some other ingredient. This emulsifying action is not, as is popularly believed, due to neutralisation of fatty acids and saponification. If the fatty substance is not rancid there is scarcely any free acid present and, moreover, saponification does not take place under conditions existing in the washing process.

An alkali is capable of assisting in the formation of a surface layer by reacting with the free fatty acid in the grease to be removed. The "surface activity" of the detergent is increased by adding alkali. The alkali lowers the interfacial tension between oil and water but does not saponify the oil to any extent. In order to maintain a constant alkali strength buffer salts are needed in the detergent.

The cleaning of dairy utensils is not merely "cutting the grease" with alkali. Milk proteins are soluble in alkali. But once coagulated or dried, solution is very slow even with a strong concentration of alkali. Therefore, something besides alkali must be used in cleaning. The cleaning solution must possess deflocculating or emulsifying power so that coalescence of the oily substances into droplets is impossible. This is prevented by the formation of a surface layer of the deflocculant around the fat globules. Surface activity is therefore a vital function in the cleaning solution. The detergent must go into true solution, not colloidal or crystalloidal, before it can become oriented and adsorbed upon the surface of the particle. Deflocculation occurs when a certain minimum concentration of "adsorbed oriented molecules" of the detergent upon the dirt particle surface has taken place.

The Alkali Film in Bottles.

As illustrating the complicated nature of the general subject under discussion, one may refer briefly to the question of ease of rinsing. Caustic soda, for example, is difficult to rinse off articles undergoing treatment, and is apt to leave an alkaline film which clings tenaciously to the surface of the bottle. Such a film may be readily detected by the "soapy" feel of the bottle, by its unusually bright appearance as it comes from the rinse tanks of the washing machine, or by the phenolphthalein test.

In the case of beverages, the presence of this film is sufficient to spoil their delicate flavours. They are likely to become flat, tasteless, pale, and clouded, owing to the partial neutralisation of acidity. Somewhat similar changes may take place in the case of certain other foodstuffs.

It is the opinion of some authorities that tri-sodium phosphate is a difficult rinser, particularly as the film which may be formed is colourless and glossy and imparts a sparkle to the glass, thus conveying a deceptive impression that the bottle is chemically clean. This type of film is also left by unrinsed caustic soda and some types of soap cleaners.

Occasionally bottlers experience trouble from the formation of a white coating on the glass. This may arise from several different causes. First, if the bottles are left in the washing solution overnight and are in the machine when it is started the next morning, this will cause a white coating in the bottles, for the reason that the bottles have been heated to a certain temperature and then cooled down. Secondly, if the solution is too heavily charged with alkali, it is sure to leave a white coating on the bottles, provided they are left in the solution over-night. Thirdly, if the solution is too heavily charged with alkali and the bottles are exposed to the air a few minutes before going into the rinse water, they will invariably have a white coating. This trouble is caused by having the water in the soaking tank too hot and the bottles becom-

ing too dry after leaving the soaking tank before they go to the rinse water. The trouble can be avoided by reducing the temperature of the wash water and maintaining the rinse water at a higher temperature.

The formation of white film on bottles may also arise by use of hard water containing lime and magnesia salts in solution. Bottles should not be put into such water until it has been softened or "broken."

In the case of washing bottles and jars in modern hydro machines, there is another important point to be borne in mind, and that is the protection of the bottle washing machinery from corrosion and rust and the effective lubrication of the working parts of the machine. In order to give complete protection to the machine it is necessary to use an alkali containing at least 60 per cent. of caustic, thereby providing ample lubrication for the working parts and that necessary film on the metal which prevents rust, scale, and corrosion from forming. It is for this reason that so many machine manufacturers recommend the use of caustic soda as the bottle washing agent, although they realise the disadvantages attendant upon the use of ordinary commercial caustic soda owing to its difficult rinsing qualities. Experiments have shown, however, that it is possible to produce cleaning materials having high caustic contents, and yet at the same time having none of the disadvantages of ordinary caustic soda and possessing entirely free rinsing qualities.

These processed caustics have sufficient caustic strength to clean bottles effectively without leaving behind any alkali film, and also have the added advantage of being manufactured in such a way that they coat the pockets of the bottle washing machine with an alkaline coating, preventing rust, corrosion, and destruction of the bottle washing equipment. At the same time their caustic content ensures the effective lubrication of the machine.

A word should be said about solutions used for hand washing as distinct from machine washing. Here, again, ordinary soda ash and crystal soda are difficult rinsing, and in order to ensure the chemical cleanliness of the bottle it is necessary to select a soda which is guaranteed to be entirely free rinsing.

For those food producers who have to handle greasy products, or products which entail the use of milk or cream, there is another point to be borne in mind. Ordinary soda ash saponifies grease and, therefore, renders the removal of grease films more difficult. Here, again, it is necessary to select a soda which will emulsify the grease deposits, thereby facilitating their removal.

A BOOK ON TRANSPARENT WRAPPINGS

A MARKED increase in the number of methods for the production of cellulose in a transparent form has taken place in the last few decades. More or less opaque forms of cellulose worked up into paper, cardboard, textiles, wadding, not to mention furniture, have been known for centuries, but it was not until the middle of the nineteenth century, following on Schönbein's discovery of nitrated cellulose, that this most abundant of all the constituents of the vegetable kingdom began to "go transparent." As a direct consequence of Schönbein's epoch-making invention, glass-clear celluloid burst upon an astonished world, paving the way for cinematography and amateur photography and a host of other industries.

What is popularly described as transparent cellulose at the present day, however, is neither celluloid nor pure cellulose, but consists essentially of viscose (hydrocellulose). By far the greater proportion of the attractive transparent wrappings round a steadily increasing range of factory products for the retail trade consist of viscose. Cellulose acetate and gelatine foils are still rather in the background, although the acetate possesses qualities which should enable it to make great headway in this field.

With manufacturers of packed foodstuffs and pharmaceutical specialities awakening to the sales pull of the sparkling-transparent wrapping, which protects the contents against deterioration while at the same time delighting the eye, it is not surprising that transparent foil manufacture is acquiring the character of a major industry. Dr. Halama's book therefore arrives at a most opportune moment, for we do not know of any other work in any language containing within its covers so much information on all aspects of the complicated processes involved in the manufacture of foils and bottle caps from viscose, cellulose acetate, and gelatine.

It represents therefore a unique and badly needed addition to the relatively scanty literature in this field. Dealing in an eminently practical manner with the three principal transparent wrappings and bottle cap materials on the market—gelatine, cellulose acetate, and viscose—Dr. Halama's work, with its numerous illustrations and the many actual samples of viscose foils, can be thoroughly recommended to all who are interested in transparent wrappings either from the standpoint of manufacture or of utilisation.

Readers of this journal will no doubt find a great deal of information of exceptional interest in Chapter G, which deals with the applications of viscose and related materials. This section is illustrated in an unusually lavish manner and vividly confirms the impression one gains from the remainder of the work that transparent wrappings have inaugurated a new era in the art of packing.

L. LIGHT.

(*Transparentfolien* [*Cellophane, Heliocell, Utraphane, etc.*]. *The manufacture and applications of transparent viscose, cellulose acetate, and gelatine foils and bottle caps, by Dr. Marta Halama;* 312 *pages with* 110 *illustrations and* 19 *samples of transparent materials. Published by Chemisch-technischer Verlag Dr. Bodenbender, Berlin-Steglitz, Feuerbachstr.* 6. *Price* 18 *marks, bound in cellophanised gold foil.* 1932.)

Mr. W. R. C. Ashby.

A NEW CANNED PRODUCT

By

SIR EDGAR R. JONES, K.B.E.

Chairman of the National Food Canning Council

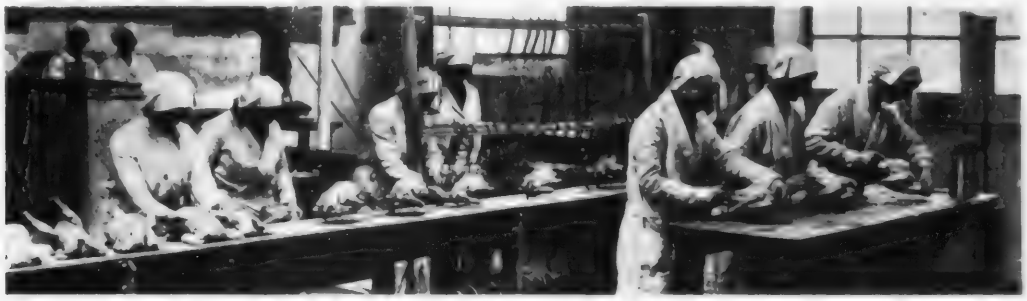
MR. W. R. C. ASHBY, The Warren Produce Company, Ightham, Kent, has introduced to this country—and, I believe, to the world—a most interesting new canned product. This product is a whole roast chicken in a can. There have for some years been canned boiled chickens, but the mass production of canned roast chicken is something new.

Mr. Ashby, in order to evolve his continuous production unit and to produce a standardised high-quality roast chicken, mobilised experts of many different kinds and spent, at his own risk, a considerable sum of money.

The mass production line is very interesting. The chickens are killed at the factory, and are forthwith plucked by power plucking machines. At the start of the preparation line there is a continuous belt and each girl worker performs one operation. Along the belt there is a series of specially designed machines. One machine cuts the skin of the neck in a special way, another removes the neck, another cuts the legs in a particular manner to suit a later device. Eviscerating is done by a simple but very ingenious apparatus.

The carcase is then fixed in a wire frame and slung on a travelling chain which passes to the roaster. The roasting arrangements involve several highly technical prob-

View in the Laboratory.



Final Preparation before Roasting.

lems, but these have been successfully solved in a scientific manner. The chain, with the chickens suspended in the special frame, emerges from the roaster; the chickens are removed, placed in the can, which is filled with pure gelatine, exhausted, steamed, and pressure cooked.

The outstanding features of the product thus treated are that tenderness is secured and also sterilisation by the pressure cooking, but without the collapse of the chicken carcase that so often happens in the case of the boiled chicken when pressure cooked. The jelly is converted into a very attractive consommé or chicken essence without much fat, leaving the jelly an attractive, clear, amber colour. Finally, the chicken cuts with an excellent white, firm flesh, and the bones are still firm, like those of the roast chicken prepared in the household. In addition to the appearance, there is also the taste effect of a roast chicken as distinct from that of a boiled chicken.

A single line equipment is sufficient to prepare up to 1,000,000 chickens per annum. The line is designed to produce small spring chickens in the early season and large family size chickens later.

There are indications that the public will consume this new product in large quantities, and it is anticipated that the main poultry producing centres will be served by factories operating the Ashby process.

Preliminary Operations.

MILK AND MALTED COCOA

Dr. Alfred Laessig describes the manufacture of milk, malt, and albumin cocoas.

SEVERAL BRANDS of so-called milk, malt, and albumin cocoas have been on the market for a number of years, the products in question being invariably a mixture of de-fatted, solubilised cocoa powder and dried milk, dried malt, or dried protein substance, these ingredients amounting to about 15 to 20 per cent. of the total.

In respect of appearance, however, the earlier attempts at this type of mixed cocoa were open to criticism, for when the added ingredients were not in an extraordinarily fine state of subdivision and—as was usually the case—were not dyed cocoa-brown with an innocuous dyestuff, the presence of the brighter-coloured particles was betrayed to the naked eye. Three methods of improving the external appearance of such mixed cocoas were available:

1. Maximum fineness of pulverisation (upon steel rollers) of the addition substances, followed by passage through sifting machines.

2. Supplementary tinting of the addition substances so as to match the brown colour of cocoa as closely as possible.

3. Highest degree of incorporation of all constituents in specially constructed blending apparatus.

It is a matter of common knowledge that no success attended the initial introduction of these mixed cocoas into the market, principally owing to the neglect by manufacturers of these three points. Patchy colour and lack of homogeneity rendered the products most unattractive in appearance.

The first point to bear in mind is that formidable difficulties are encountered in attempting to achieve the desired uniformity when starting out with the ingredients in the dry state. Simple mixing in the dry state will never bring about a really intimate blending of two heterogeneous substances. From the purely mechanical standpoint, the product under discussion will merely contain four cocoa particles side by side with one particle of malt powder or other additional substance. Only by handling the ingredients in the liquid state can the manufacturer hope to achieve that perfect blending which is later reflected by a harmonious flavour acceptable to the palate. It follows that the blending operation should be carried out on semi-manufactured products.

There has, however, been no lack of difficulties of recent years in attempting to follow out these basic principles in practice, so that it is interesting to note that a milk-cocoa has now been marketed by a certain Dutch firm which has actually been successfully produced by the amalgamation of liquid cocoa-mass with liquid milk.

Examination of this product, after making up with hot water, reveals that the particles do not remain in suspension for any considerable length of time, formation of sediment being observed after standing for 24 hours. Such a property is, indeed, not to be expected, for not even a microscopically fine powder can maintain its buoyancy indefinitely after infusion. From the author's tests, however, it must be admitted that the product in question possesses an extraordinarily good suspension power, although not appreciably better than that of ordinary cocoa powder. The slight improvement of the new product in this respect may be ascribed to the presence of 20 per cent. of milk substance, the low specific gravity of which enables it to remain in suspension for a longer period than the cocoa particles alone.

We are able to outline the stages involved in the manufacture of milk-cocoa by the Dutch firm in question. In contrast to other Dutch manufacturers, who treat the previously roasted and broken beans with potassium carbonate solution, this firm prepares, in the first place, finely powdered fatty cocoa-mass. Ordinary cocoa powder is treated with 5 per cent. solution of potassium carbonate dissolved in warm water, whereas for the preparation of the new milk-cocoa they employ a 2 per cent. potassium carbonate solution in order to avoid subsequent unfavourable action of any excess alkali upon the added dried milk. It is well known that an unduly high alkali content later reacts unfavourably upon the fatty substance of the added milk.

Into a strongly heated vacuum mixer of 1,200 litres capacity are introduced 800 kg. cocoa-mass which has been rendered weakly alkaline or solubilised in the above manner. This is followed by the addition of 300 kg. of condensed milk, the latter being obtained by the Dutch firm daily in a fresh condition from a neighbouring condensed milk factory. By arrangement with the latter concern, the milk is concentrated in the vacuum plant until its composition corresponds to exactly 1 part of water and 2 parts of milk. As delivered to the cocoa manufacturer, the specified weight of 300 kg. liquid condensed milk preparation would therefore contain exactly 100 parts water and 200 parts dried milk.

Owing to the combined influence of the heated walls of the vessel and the intensive mixing action of the biaxial stirring gear, an exceedingly thorough incorporation of the cocoa-mass with the viscous condensed milk is

effected. Removal of water from the mass is effected by vacuum, the whole of the 100 litres of water in each charge being completely driven off in 3 hours, leaving 1,000 kg. of moisture-free cocoa-milk preparation, with a fat content of 48 per cent.

This figure of 48 per cent. fat content is arrived at by the following simple calculation:

Cocoa-mass	80 kg. including fat 54 per cent., *i.e.* 43·2 kg.
Condensed milk ...	30 kg. made up of
Dried milk substance	20 kg. including fat 24 per cent., *i.e.* 4·8 kg., and
Water	10 kg. removed by vacuum.

43·2+4·8 = { 100 kg. anhydrous liquid cocoa-mass containing 48 kg. fat (cocoa-butter+milk fat).

This milk-cocoa mass possesses a fairly high fluidity by reason of its high fat content. It is next subjected to pressure in a large 12-pot hydraulic press.

A somewhat awkward factor which cropped up in the course of the expressing operation consisted in the necessity of avoiding removal of an excessive amount of fat from the mass. In view of the fact that the dried milk substance remaining after expulsion of the water possesses a fat content of 24 per cent., it is essential to see that the pressed cake does not contain less than 24 per cent. fat, expressing beyond this limit leading to removal of both cocoa-butter and milk fat, with consequent contamination of the former with the latter. This difficulty was found to be completely avoided by pressing the milk-cocoa to such an extent that the pressed cake, and later the powder, contained a minimum fat content of 20 per cent.

Since each 6-pot unit of the 12-pot press employed takes a charge of 72 kg., from which 23 kg. of cocoa-butter are expressed, the resulting press-cake and the milk-cocoa possess a fat content of 24 per cent.

The next stage consists in pulverising the press-cake, followed by extremely fine screening in a wind-sifting apparatus.

The colour of the milk-cocoa in question is of an extremely uniform character, but the omission of dyestuff from the condensed milk accounts for its paler colour by comparison with the soluble cocoa powder marketed by the same firm. The flavour is irreproachable and the suspension power is decidedly good, although, of course, not so perfect as to avoid development of a sediment after standing for 24 hours.

On attempting to instal a similar process in a Berlin cocoa factory, the first difficulty which arose consisted in the inability of any condensed milk factory in the district to guarantee the delivery each day of thickened condensed milk containing exactly 33⅓ per cent. of water. Attempts were therefore made to modify the process to the extent of using fresh dried milk.

The Berlin firm, furthermore, wished to use an entirely new design of a Petzholdt type of vacuum rotation conche in place of the machine used by the Dutch firm. The new vacuum conche has a capacity of 1,000 kg., and it gave extraordinarily good blending performances.

The method finally worked out for the special conditions prevailing at the Berlin factory involved conching a charge of 800 kg. hot cocoa-mass and 200 kg. fresh dried milk (full milk) with 24 per cent. fat content. The initial fat content of 48 per cent. thus corresponds to that obtained in the Dutch process after withdrawal of the evaporated water.

The necessity, however, then arose of reducing to a fine condition the mass which develops a coarse grain as a result of the introduction of the milk powder. This was achieved by again fine rolling the milk-cocoa mass withdrawn from the rotation conche. The product was allowed to solidify in moulds in the cold room, the resulting blocks being then cold-rolled upon 5-roll steel mills. The re-liquefied mass was then finally put through the rotation conche for a short time.

As in the case of the Dutch process, the next stage consisted in pressing the mass, the cakes being ground and sifted by means of a grinding and sifting plant with cold chamber and wind-sifter.

As mentioned above, this method actually enabled the Berlin firm to produce a milk-cocoa product of a quality equal to that produced by the Dutch firm; not even an expert could detect the slightest difference in taste. Full details of these methods have been given in the hope that they will be of value to other cocoa manufacturers who are not in the fortunate position of being able to secure regular deliveries of fresh condensed milk containing exactly 33 per cent. fat.

The manufacture of malted-cocoa and albumin-cocoa is on entirely the same lines as that of milk-cocoa. It goes without saying that the cocoa-butter expressing operation must not be carried too far, in order that the mixed product should contain 24 per cent. of fat, because both dried malt and dried albumen are free from fat. The following calculation is applicable:

20 parts by weight dried malt or dried albumin.
80 parts by weight cocoa-mass; fat content 54 per cent., *i.e.* 43·2 parts by weight.

100 parts by weight.
25 parts by weight expressed cocoa-butter.

75 parts by weight press-cake or powder with 26·6 per cent. malt or protein content and 24·3 per cent. fat content.

It should be stressed, in conclusion, that only modern, efficient machinery will enable the manufacture of these somewhat novel products to be carried out successfully.

Fish Canners at Southall

MESSRS. ANGUS WATSON AND CO., LTD., the well-known manufacturers of ready-to-serve foods, who are in association with Imperial Canneries, Ltd., of Stavanger, Norway, have recently transferred manufacturing operations from Newcastle to Southall.

Actual details are not at the moment available, but further official information from Messrs. Angus Watson and Co., Ltd., will be published in a later issue.

NEW FOOD LAWS

Some Criticisms of Mr. H. E. Monk's Article Published Last Month

MR. MONK'S article advocating a revision of the present Food Acts has aroused great interest and, in some cases, no small measure of adverse criticism. We give below some of the views that have been expressed.

We take this opportunity of reminding readers that some time ago the Ministry of Health appointed a Departmental Committee to enquire into the working of the food laws, but its operations were suddenly suspended at the commencement of its labours owing to "the need for economy in national expenditure." It seems likely, however, that the task of the Committee will be resumed before long. Pending this, we understand that the Council of the Society of Public Analysts has prepared a careful statement embodying the views of public analysts as to the directions in which reform is necessary, taking into account all such arguments as those set forth in Mr. Monk's article. No doubt these views will be presented to the Committee by chosen representatives of the Society. Many of our readers will recollect that the matter was discussed by Dr. J. T. Dunn at the Annual General Meeting of the Society of Public Analysts, held on March 4, 1932.

For further information reference may be made to a Report For The Year 1931 made by Mr. F. C. Bullock, B.Sc., F.I.C. In this Report it was stated that "a Departmental Committee was appointed during the year to enquire into the working of the Food Acts, but their deliberations were subsequently cut short on the score of national economy. This is to be regretted. The present laws are by no means satisfactory; and, while causing at times much anxiety to honest shopkeepers, nevertheless fail to give full protection to the consuming public. In consequence, the ways of those administering the food laws are beset with difficulties. Present-day conditions differ widely from those the original Act was designed to meet; and it is to be hoped that before long another effort will be made to bring in some workable legislation that will effectively control the trade in the many new lines of food now on the market.

In 1930 the position with regard to the composition of factory made jam was realised to be so unsatisfactory that manufacturers themselves took the initiative; and, in collaboration with representatives of the Society of Public Analysts, the members of the Jam Section of the Food Manufacturers' Federation agreed that all jam made by them should conform to certain standards laid down, and be labelled accordingly. These standards are open to criticism, and they certainly have not failed to receive it; nevertheless, the departure is a real advance.

The position with regard to strawberry jam, for instance, is now as follows:

First quality strawberry jam must contain at least 42 per cent. strawberries.

Second quality strawberry jam must contain at least 20 per cent. strawberries.

First quality strawberry and goosebery jam must contain at least 20 per cent. strawberries.

First quality gooseberry and strawberry jam must contain at least 10 per cent. strawberries.

Second quality strawberry and gooseberry jam must contain at least 10 per cent. strawberries.

Second quality gooseberry and strawberry jam must contain at least 5 per cent. strawberries.

To be sure of even 5 per cent. of the fruit whose name occurs on the label is something, if not very much; and the stronger the criticism levelled against the present standards, the greater the implied reflection against the conditions prevailing before the standards were introduced."

In discussing margarine, Mr. Bullock quotes the following report:

"Butter and modern margarine are very similar substances, differing only in price, chemical composition, and nutritive value. In appearance they are indistinguishable; and in flavour and texture they can often be differentiated only with difficulty.

The regulations governing the wrapping and packing of margarine are very clearly set out in the Food and Drugs Act, and their purpose is to widen the existing slight difference between the two articles, margarine and butter, in order to protect the public from getting the one instead of the other as a result of fraud, carelessness, or accident.

The measures adopted for the purpose in this country are not nearly so drastic as those adopted abroad. For instance, in Australia, margarine must be coloured pink; in Denmark and other countries, it must not be coloured yellow. . . . In Germany, margarine must contain at least 10 per cent. of sesame oil, a substance which is easy of detection.

In this country, the regulations simply require that when margarine is sold by retail, the outside of the outer wrapper shall bear the word MARGARINE in half-inch block letters, no other printed matter beyond a statement of the weight appearing on the label.

Nothing could be simpler than this, and we can only recommend that the slightest departure from this specification should be regarded as evasion. . . ."

English Ideals.

A public analyst who does not agree with Mr. Monk's views makes the following statement:

"The Food and Drugs Act is an anti-adulteration Act and no more. It is capable of checking the offence of brewing beer from arsenical glucose but has no authority to impose a standard of excellence in the beer that is sold. Is this a pity? Should we be better off if foods were subject to regulations as drugs are to the Pharmacopœia? It is easy to imagine that the label 'Food Standard' might be made use of to recommend beer that complied with the food standard but was nevertheless quite unpalatable.

The case of lemon cheese has been quoted. When a housewife buys lemon cheese, does she expect it made exactly as her mother made it? And did her mother make it exactly like her mother's sister?

When the first trader prepared lemon cheese for sale, did he do more than offer a delicacy that he hoped the housewife would like as well as that which she made herself? Does the trader who makes Christmas puddings for sale do more?

Where, however, a practice has become established among manufacturers and traders to designate a particular article by a definitive name and where there is a danger that the competition for cheap production may lead to a depreciation of the article, then it is the duty of representative manufacturers to agree among themselves and to make known what the standard of excellence should be. Public analysts and executive authorities can then be trusted to administer the Food and Drugs Act in accordance with their decision.

This is a course which has been happily followed in the case of certain articles, and it will no doubt be followed in regard to others in future. Such confidence in manufacturers is more consonant with English ideals than are some of the methods of bureaucratic rule existing in certain foreign countries.

Would the great canning industry have attained its present high level of excellence any sooner or at all if it had been subjected from the outset to severe penalties for every defect? It seems doubtful.

The hoary and hair-raising legends of foods coloured with lead chromate, red lead, and other pigments may be doubted. Those legends have descended to us from times when analytical skill was rare and when responsibility for such a mis-statement was light. If justice were done these ghosts would be laid as was done with a more recent phantom, the ptomaine, that was formerly often saddled with the blame for trouble.

It will be generally agreed that the sale of a mixture of coffee and chicory ought to be subject to a provision requiring that the proportions should be disclosed to the purchaser.

In the case of such mixed commodities it is the net weight of each that affects the purchaser's interest, and the desirable provision would be more properly a supplement to the Weights and Measures Act than to the Food and Drugs Act."

An Involved Problem.

Mr. F. C. Bullock, while agreeing with some of Mr. Monk's contentions, reminds us of the intricate nature of the problem.

"I am glad to have the opportunity of making a few observations on Mr. Monk's article in the January number of FOOD MANUFACTURE.

In the main I agree, as probably most other public analysts do, that an excellent opportunity was missed, when the 1928 Act was passed, of bringing the present food laws up to date, and that a further attempt should be made to improve the present position. I further agree that some improvement can be achieved by the introduction of standards; but I am convinced that the problem is more involved than is usually realised, and that a somewhat elaborate scheme of definitions for simple substances, and standards for composition of compound articles, will be necessary to meet the position.

Mr. Monk hits the nail on the head when he enunciates the principle, 'The purchaser should not be deceived at the time of purchase.' That, to my mind, is most important.

I must confess to having modified my attitude since January, 1930, when I made a contribution to a discussion of the present question by the S.P.A. For instance, regarding the article *dripping*, those samples containing 100 per cent. fat were solid homogeneous materials, looked just what they were, and would be purchased for cooking purposes. Another sample, containing 50 per cent. water, obviously contained a large amount of meat extractive, and would be purchased deliberately by a certain class of customer for its flavour, etc.

The two articles were dissimilar and fulfilled different purposes, but in neither case would there be deception at the time of purchase. It would be undesirable, therefore, for any system of standards to operate so as to banish either product from the market as long as both are in demand.

Likewise, in the case of *ice-cream* it would be senseless to institute any standard of, say, 8 per cent. fat without making provision for the sale of the 'cold custard' variety of hokey-pokey, which can be retailed to children at ½d. per portion so long as the latter is wholesome. At the same time the rich product containing upwards of 10 per cent. butter fat retailed by one firm requires some protection from competition by an article containing gelatine or starch and perhaps less than 5 per cent. fat retailed under similar conditions by another firm.

Cream presents an extremely difficult case, since the appearance and viscosity are no criterion of the fat content, while the cost of analysing and standardising would be prohibitive to small firms.

In many cases the public can discriminate between the real and the faked, and articles of food only sell at a price commensurate with their quality. Even the oft-quoted *lemon curd*, made of citric acid, glucose starch, margarine, and annatto, while it need not necessarily be unwholesome, would actually deceive very few people, and, if it can be made under hygienic conditions and sold at about half the price of the original article, it will always have a certain market, and should be provided for in the system of standards.

I congratulate your journal on enabling Mr. Monk to bring this very important matter into the open. At the same time I think it very important that the much-harassed retailer should be preserved from further legislation unless some very good purpose can be achieved thereby.

On the question of exaggerated claims on labels and in advertisements, especially in the case of drugs, I think there is more room for immediate action, and in all that Mr. Monk says on this matter he has my unqualified support."

Some Criticisms.

Mr. T. McLachlan, Joint Public Analyst for the city of Westminster, makes the following observations:

"Mr. H. E. Monk is to be congratulated on his efforts to maintain the high standard set up by previous public analysts for the city of Salford, and his article in the January issue of FOOD MANUFACTURE is provocative of deep thought. At the same time it would appear doubtful whether any manufacturer would disagree with him as to the necessity of a new Food and Drugs Act; where the divergence of opinion exists is in the composition of such an Act.

It seems difficult to believe that Mr. Monk really wants a Food and Drugs Act on the lines of the British Pharmacopœia, with about 100 pages of introduction, 800 monographs on various articles which are sold in shops, and about 50 to 60 appendixes, specifying how each part of the Act is to be interpreted. Yet carried to its logical conclusion this is what would really happen, and, moreover, such an Act would have to be written up so that it could fit into a loose-leaf book, otherwise, when it was found and decided that a further 0·5 per cent. of water should be added to lemon cheese (last prepared with 98 per cent. water), the new regulation would have to be kept in an envelope and, in case of a suspected infringement of the law, there would be a great turning over of regulations to find out exactly what was the latest requirement.

There is a theological saying that it is well to be good if only through fear of going to hell, and it will be generally admitted that there are one or two food manufacturers who only sell edible products because they are frightened of the long arm of the law. The present generation of man is no more moral than his forebears; quite recently cayenne pepper sold on the Continent consisted largely of red lead, and in 1930 tri-o-tolylphosphate was added to ginger extract in America, causing paralysis among those who consumed it. It is very probable that there would have been little appreciable improvement in the foods and drugs of this country if it had not been for the Sale of Food and Drugs Act of 1875.

I am in perfect agreement with Mr. Monk when he states that the fixing of a minimum standard will not mean that this becomes, as is usually claimed, the maximum, and one has only to take the case of milk to illustrate this. In 1875 the average fat content of milk sold in the streets was probably about 2·8 per cent. or less; now it is nearer 3·5 per cent., yet the legal standard is only 3·0 per cent. Obviously in 1875 milk vendors as a whole had found that it did not pay to be honest; the public could not differentiate. Therefore Mrs. John Citizen bought in the cheapest market and got as much water as the milkman thought it advisable to add, or as little fat as he could safely leave in, when he wanted some cream; nowadays she has to do without her Christmas present on Christmas Day or Boxing Day. We have the same situation at the present time with regard to cream, for which there is no standard, and some people very logically argue that cream is milk with a high fat content. Many canners of cream state that it is impossible to can cream containing more than 25 per cent. butter fat, yet I have had several which contained 50 per cent. of butter fat. Here Mrs. John Citizen does really think that she knows something, so she informs Mrs. Bull that 'Pansy' cream is much better because it is thicker than 'Poppy' cream, but she is unaware that in reality Pansy cream is better homogenised and that it actually contains less fat than Poppy cream.

Mr. Monk does not make any distinction between the gradual alteration of the composition of an article, which he chooses to call adulteration, and that which the manufacturer considers intelligent education of the public palate. The former low practice is frequently adopted by small manufacturers and is to be thoroughly deprecated; the latter may be adopted by large firms, who are able to substantiate their claims if there should be any dispute in the matter. Every public analyst and food inspector of experience appreciates this.

Mr. Monk's quotation from the warning issued by the Government of the United States might put an end to advertisements of the character 'Contains no POISON,' but it would not prevent the use of terms such as 'Contains the maximum amount of butter allowed by law' for margarine.

When there is any dispute about such a thing as tin in a food at the present time, the argument usually adopted is, 'Is this amount likely to cause harm to the consumer?' Naturally this point should be raised, but it does not go far enough. It is insufficient to prove that tin is likely to be dangerous in a quantity of 2 grains per pound. The main question to be answered is, 'Need 2 grains of tin per pound be present?' and for this it should be sufficient to produce evidence that reputable manufacturers find ½ grain per pound all that is necessary. The quality of tinplate is much superior at the present compared with that obtainable in 1910, at which time also good lacquers were almost unknown, so that one may fairly expect a better canned article now than formerly.

This brings us to another weakness of the present state of the law. It is illegal to add preservatives *ad lib.* to foods, but one can do what one wishes with drugs so long as they are not labelled B.P. Thus, for instance, a manufacturer has trouble with a preparation, and he inserts what he likes to make it keep, and if there is any argument about it—well, either it is legal or else it is a necessary ingredient for the purpose for which the medicine is intended.

There can be no question that many drugs, particularly vegetable extracts, contain considerable quantities of copper, which is not only unnecessary, but poisonous; yet, while the food manufacturer would be immediately condemned, the manufacturing chemist, whose products are to cure the sick, escapes with impunity.

If I may refer to one other part of the law—that dealing with milk—is it not absurd that the law at the present time actually encourages the production of cheap, dirty milk, which is to be pasteurised afterwards, instead of supporting improved methods of farming, which will give a clean, pure article, and better transport, which will ensure its delivery to the consumer in almost the same condition in which it came from the cow?

In the matter of dyes a new Act might do well to follow the lead of the U.S.A. and state what dyes should be permitted, with an allowance that definite pharmacological evidence in favour of other dyes should allow them to be included in the list. It seems irrational to lay down a hard and fast law with regard to preservatives and to allow dyes to be used in such quantity that they may act in this way without the necessity for any other preservative. The present regulations with regard to the use of benzoic acid are illogical. I recently examined some canned herrings, which contained benzoic acid formed during the pickling process from one of the ingredients employed for flavouring. Yet this very article was condemned by one analyst for containing a preservative.

I would, in conclusion, urge a more general use of the caution to vendors of adulterated samples, where it is obvious that such adulteration has taken place either accidentally or through ignorance; in my experience this practice may do more to raise the standard of foods than a prosecution can."

Analytical Standards.

Mr. H. F. Barke, F.I.C., Public Analyst of Bath, makes these suggestions: "I think that further legislation is desirable with reference to the standardisation of food products, but the regulations must be of such a nature as to allow for—

1. Various grades, as in the case of cream, cheese, etc.
2. Improvements in lemon cheese, etc., since we cannot bind future generations to the recipe of any particular grandmother.
3. Workable analytical standards, as in the case of sausage, the standards for which, laid down during the war, were found to be impracticable for the public analyst."

An Advisory Committee.

Mr. D. R. Wood, F.I.C., Public Analyst and Bacteriologist to the Somerset County Council, agrees that a revision of the present system is necessary. He says: "I am very interested in the article of Mr. H. E. Monk, B.Sc., F.I.C. I entirely agree with him that the English law in relation to the adulteration of food is most inadequate; our Colonies are far in advance of us. I am strongly in favour of powers being given to the Ministry of Health to make regulations with regard to any foodstuff and the appointment of a permanent Advisory Committee consisting largely of members nominated by the Society of Public Analysts and also representing manufacturers and merchants. In this way the various articles of food could be dealt with *seriatim* and with due deliberation and a suitable schedule of regulations and standards built up in course of time."

A Holiday from Legislation.

Dr. James Thompson, of the University of Reading, is against any interference with the Government's programme. He writes as follows:

"I consider that any recommendations for additions to or alterations of the food laws should come—and doubtless will come when the need is sufficiently urgent—from a recognised body. I regret that I cannot comment on any private expression of opinion on this subject.

Generally speaking, and things being as they are, I favour rather a holiday from legislation to enable the Government to get on with its proper job—viz., governing. We are being over-legislated, and the capacity of the people to come in when it rains is being bred out of them."

A New Exhaust Box

THE other day we had the privilege of seeing the first processor built in this country according to the design of John T. Tucker. It is understood that this machine is in successful use by Libby, McNeill and Libby in California. A novel method is employed for conveying the containers through the box by means of a combination of forward and lateral motions imparted, by an adaptation of the eccentric principle, to a series of parallel metal strips. The containers come from the syruping or filling machine in single file, but on reaching the feed end of the box they are automatically split up into two or more lines for passage between guides through the box itself. At the discharge end the lines are united before they pass under the seaming machine.

It is claimed that this arrangement results in increased capacity of the machine per unit of floor space occupied, that there is a minimum of wear in spite of very little lubrication being required, that the largest machine requires only a 1 h.p. motor, that the operation is extremely simple and every part is readily accessible, and that the machine can handle any size or shape of tin or glass container.

There is a choice of three methods of heating the box—viz., by steam or water, up to 210° F., or by dry heat up to 400° F., by means of steam under pressure. The heating system consists of closed coils, which has its obvious advantages. Under these conditions it would appear that the box can be used for processing as well as heat-exhausting.

TRADE NOTES

British Industries Fair, 1933.

The British Industries Fair, which is being held from February 20 to March 3, shows every likelihood of proving an unprecedented success.

Ten thousand copies of the advance overseas edition of the catalogue have been dispatched to prospective buyers abroad by the Department of Overseas Trade.

As the catalogue indicates, the Fair will be of record proportions. The "heavy industries" section, to be held at Castle Bromwich, Birmingham, has already been filled by exhibitors almost to overflowing. It is stated that, altogether, the floor area of the buildings occupied in London and Birmingham will be nearly thirty acres and the frontage of the indoor stands will run to about twenty miles. More overseas buyers than ever have indicated their intention to visit the Fair this year.

FOOD MANUFACTURE, in conjunction with its associated papers, *The Manufacturing Chemist* and *Paint Manufacture*, will be exhibiting at the Birmingham section. Readers are invited to call at the stand and will be made heartily welcome.

* * *

Cases and Containers.

An interesting booklet on Fibre-Board Packing Cases has been received from Messrs. Hugh Stevenson and Sons, Ltd., who were numbered amongst the first prize and gold medal diploma winners at the recent Canners' Convention.

The booklet describes and illustrates the principal types of cases and particularises the fields for the various styles and the different materials used, showing how they should be packed and sealed. The Stevenson cases for canned goods display several interesting features. A specially strong board is used, with a guaranteed test of more than 300 lb. to the square inch. The cases are made with vertical grain, which doubles the strength where it is most required at the top and bottom edges. They are also double lined to withstand the rubbing liable to be caused by the edges of the tins.

A further line of interest is the "Snowpura" tray, a greaseproof and waterproof container which is used for all kinds of cooked and uncooked table delicacies and has been awarded the certificate of the Institute of Hygiene. The "Snowpura" folder is tastefully executed in colour work, and should attract a good deal of attention to the container in question. Copies may be obtained from Messrs. Hugh Stevenson and Sons, Ltd.

Temperature Control.

A solution to temperature problems is often afforded by the careful study of temperature charts. Drayton Temperature Recorders automatically record temperature ranges up to 1,000° F. or equivalent centigrade. They are made with bulb connected to the instrument by flexible connecting tube or with bulb arranged integral with the instrument. The latter are used for recording room temperatures. Portable instruments are supplied either with bulb integral with instrument for room temperatures or alternatively with flexible connecting tube wound on a suitable support at the back of the case.

According to the temperature range for which these recorders are constructed, one of three operating principles is utilised:

(*a*) The vapour pressure of a volatile liquid.

(*b*) The direct expansion of an inert gas.

(*c*) The expansion of mercury.

These three types are designated Class I., II., and III. respectively, and each, of course, has its own special applicability.

Drayton recorders possess many interesting features which are clearly set out, explained, and illustrated in a small booklet issued by the Drayton Regulator and Instrument Co., Ltd., who manufacture all types of temperature, pressure and humidity indicators, recorders, and regulators. The booklet referred to (list No. 107 c) recommends itself to all manufacturers interested in the control of temperature and related problems.

Soya Flour Developments.

We have lately received a number of recipes from Messrs. Nutrient, Ltd., which aptly illustrate the many uses to which soya flour can be put. The recipes, which apply to bread, bun, and cake making, are said to have been specially tried out with the "Floya" brand of soya flour, which is marketed by Messrs. Nutrient, Ltd. Although "Floya" is obtained by an extraction process, it is affirmed that the brief period of processing ensures that all the qualities of the bean are preserved.

The field of application of soya flour is a particularly broad one. It is already widely used (though in comparatively small quantities) in bread and cake making, but it has definite possibilities in other branches of food production, especially in connection with proprietary foods of the cocoa, malt, and lecithin type. The food value of the soya bean has never been in dispute. Now that the products derived from it are improving so noticeably in taste and appearance, it would appear that its more general use in foodstuffs is not far distant.

* * *

Butter Packing.

An interesting folder, illustrated in colour, has been issued by Hermeton Ltd., describing the Hartmann butter moulding and wrapping machine.

The machine has been produced as a result of experience gained in the Danish dairying industry and, state the makers, operates with the services of one unskilled assistant. It can pack either 1 lb. or ½ lb. pieces, which are automatically wrapped at a high rate—the total power required being about 2½ h.p. A feature which will appeal to prospective users who have only limited space at their disposal is the compact nature of the plant, which requires only about 45 square feet of floor space. The two electric motors are built-in, and it is claimed that the machine sets entirely new standards of efficiency and simplicity.

* * *

Inventions in 1932.

We have received a note under this heading from Messrs. Gee and Company, patent agents, who report an improvement in patent activity in this country during the past year.

1929 was a peak year for patent applications, but 1930 and 1931 showed a decided decrease. In 1932, however, applications increased by approximately 1,000 over the previous year's figures, and Messrs. Gee think that this may be regarded as a hopeful and satisfactory indication of the trend of trade.

Incidentally, they mention that, as against the increased activity mentioned above, there has been a considerable diminution in the number of foreign patent applications emanating from this country.

* * *

Colour Measurement.

In the manufacture of food products, as in many other branches of industry, the necessity for defining or specifying colour frequently arises. An accurate and convenient instrument for this purpose is the Lovibond Tintometer, which enables the rapid specification or definition of colour in terms of reproducible units or standards in the form of graduated and numbered glass slides.

The apparatus is a complete colorimeter designed for use in all laboratories and factories where the colour of materials, either liquid or solid, has to be tested. As the colour of many products is a direct indication of their quality, and accurate standardisation of colour is in many cases absolutely essential, the practical necessity for some sort of colorimeter cannot be questioned.

Some of the chief advantages offered by the Lovibond Tintometer are as follows:

1. It is compact and portable.
2. The fields of vision are side by side.
3. Neutral tint slides can be superimposed on the colour field to render matching accurate.
4. The indicator is visible while making observations.
5. The instrument can be used to determine the colour of opaque substances as well as for transparent liquids or solids.

* * *

Renovations.

Food factories, more often perhaps than other factories, need continual renovation if they are to be kept in a thoroughly hygienic condition. Premises require repainting, stoves re-enamelling; many odd jobs, in fact, need to be done which are likely to involve either the paint brush or the spray apparatus.

The spray has nowadays, in most cases, even for the carrying out of comparatively light duties, made the use of the brush unnecessary. A small spray apparatus such as the B.E.N. Handi-Spray (a folder concerning which has just been sent to us) may be had for an extremely moderate sum, and is very simple and efficient in action. This particular spray outfit is capable of handling cellulose lacquers, paints, distempers, etc., and suggests itself for use for a wide variety of purposes. Fuller particulars are to be had from Messrs. B.E.N. Patents, Ltd., on application.

* * *

The British Association.

The annual meeting of the British Association will be held at Leicester, from September 6 to 13 next, under the presidency of Sir F. Gowland Hopkins, president of the Royal Society.

Professor R. Robinson, F.R.S., who heads the chemistry section, is among the sectional presidents appointed.

* * *

Stainless Steel.

The quality of manufactured food products is always adversely affected by the use in the factory of unsatisfactory equipment.

The particular advantages offered in this connection by stainless steel containers are briefly outlined in a small pamphlet issued by Messrs. Isaac Webster and Sons, Ltd., the well-known sheet metal specialists of Leeds.

Stainless steel utensils are exceptionally durable. They cannot chip or rust, and, being unaffected by salts and meat or fruit juices, are thoroughly hygienic in use. An additional and important point, state the makers, to remember is that stainless steel can be effectively cleaned simply by means of hot water washing. This, of course, entails a good deal of saving in time and labour.

Messrs. Isaac Webster and Sons, Ltd., manufacture in stainless steel replicas of most utensils which have previously been made in other metals, porcelain, and glass.

* * *

The Brighter Lorry Movement.

A food manufacturer's van or lorry is one of his best advertisements. Always provided, of course, that it possesses an attractive appearance. Even lorries must keep up appearances, and not even the most luxurious of vehicles can continue to look at its best unless it is kept thoroughly clean. The Chevroc Minor car washer is claimed to afford an efficient and inexpensive means of keeping vans and lorries in proper condition. Fuller particulars are to be obtained from the Power Plant Co., Ltd.

* * *

U.W.S. Extension.

A noteworthy addition to the already large number of works establishments designed on ultra-modern lines which are rapidly springing up around London is the spacious new building recently built and equipped at Gunnersbury by United Water Softeners, Ltd., water purification engineers, of Aldwych House, W.C. 2, with the object of providing increased and more convenient accommodation for their growing technical and commercial staffs.

The firm's new premises stand at the junction of the Great West Road with Chiswick High Road and Gunnersbury Avenue. They include very completely equipped analytical and research laboratories, devoted to the examination of water samples and the elucidation of treatment problems; an experimental and testing station; and a spacious and well-lit suite of offices for the technical, sales, and advertising departments.

United Water Softener's registered offices and showroom remain at Aldwych House as heretofore, and manufacture of their water purification plants will be carried on as at present at the company's Lightpill Iron Works, Stroud.

* * *

Vanilla.

The forward position of vanilla beans remains unchanged. The 4-in. bean is at about 4s. 4d., the 5-6-in. at about 5s. 10d.

Turning from natural vanilla to vanillin, some interesting information has just been sent us by Messrs. A. W. Munns and Company concerning the product Vanillal manufactured by their principals, Roure Bertrand Fils and Justin Dupont, of Argenteuil.

Vanillal, which is said to find considerable application in the French food industry, is synonymous with ethyl protocatechuic aldehyde. As a substitute both for natural vanilla and for vanillin, this product, which is a crystalline body soluble in water and alcohol, shows several distinct advantages. It is about four and a half times more powerful than vanillin and is held by many to approximate more closely in flavour and aroma to the natural article. To obtain the best effect it must naturally be used in smaller quantities than vanillin. The field of application is wide, including chocolate, biscuit, ice-cream, and confectionery manufacture. Further information concerning its uses and application may be had on application to Messrs. A. W. Munns and Company.

* * *

Sealing Transparent Packages.

A new and interesting development in packing aids has been brought forward of late by Messrs. Durex Abrasives, Ltd.

It is a cellulose tape made especially for sealing transparent wrapped packages containing cakes, sweets, toffees, meats, sausages, and other food products marketed in a similar fashion.

This tape requires no moistening, and will stick to any clean, dry surface. It holds fast instantly to both moisture-proof and ordinary transparent wrappings, and cannot slip loose. The fact that it will not transmit taste or odour to food products and that its highly glossed appearance is a decided attraction, render it an exceedingly useful packaging accessory. It has already received the approval of transparent paper manufacturers.

In conjunction with automatic packaging machines, Durex tape is now being used to form transparent bags for hard sweets, nuts, and other free-flowing merchandise, filling the bags and sealing with the tape in one operation. It is available in several styles and colours, including a transparent line, which also suggests itself for use in the repairing of torn maps, tracings, etc.

Further particulars and samples of the tape may be obtained on request from Messrs. Durex Abrasives, Ltd.

Spectacular Deliveries.

We learn from Messrs. J. S. Fry and Sons that the aerial delivery service inaugurated by them last September is to be speeded up by the use of parachutes.

An official stated that, on certain journeys of the air van, it is proposed to drop supplies of chocolate and cocoa at various intermediate fixed points, thus obviating the loss of time consequent on landing.

Fry's air delivery van, a Puss Moth, has been called into service many times to make rush deliveries to retailers all over the country.

* * *

Cooking Potato Chips.

Our attention has been drawn to a brief article on a Continuous Cooking Method (*Food Industries*, October, 1932) which outlines the advantages to be gained by utilising a continuous process for the cooking of noodles, potato chips, and similar products.

It is observed that the traditional operation carried out in batches leaves in several respects a good deal to be desired. The oil temperature is bound to fall each time the vat is charged with fresh supplies, and cooking cannot re-ensue until the temperature has again risen to approximately 300° F. This brings about a lag period during which the products lose moisture and are liable to become soggy with oil, thus increasing expenditure and spoiling appearance at the same time. Another disadvantage is that cooking remains uneven, either the outer portions of the batch tending to be overcooked or the inner portions undercooked.

The article goes on to describe how the La Choy Food Products Inc. of Detroit overcame these difficulties by installing cooking equipment incorporating a Sandvik belt conveyor. Information concerning Sandvik equipment may be obtained from the Steel Band Conveyor and Engineering Co., Ltd.

* * *

German Canning Equipment.

As the result of an agreement made with the Karges-Hammer Maschinenfabrik A.-G., one of the oldest established German firms of automatic canning equipment makers—Messrs. F. J. Ballard and Co., Ltd., are now able to produce at their Tipton works the full range of vegetable canning equipment designed by the Karges-Hammer Company. The machines embody the experience gained by the German concern during fifty years' connection with the vegetable canning industry on the Continent, and Messrs. F. J. Ballard have the advantage of the full technical co-operation of their original makers.

* * *

A New Type of Heater.

A folder recently received from the British Unit Heater Company contains many interesting details of copperad unit heaters for steam, hot water, and vapour systems.

These heaters, unlike the majority of radiators, force the warm air down to floor level, while louvres provided at the face permit the concentration of heat on draughty areas and thus ensure the elimination of cold spots. They consist of three essential parts—the heating battery, the casing, and the fan assembly.

As an example of heating value in proportion to size, it has been stated that a copperad unit heater weighing only 48 lb. has proved equal in heating value to over 9 cwt. of cast-iron radiators.

Copperads are used not only for general heating, but also for speeding up drying processes in connection with confectionery manufacture, bottle and dish washing, etc. The technical department of the British Unit Heater Company is always ready to advise on special heating problems.

* * *

Canning Machinery.

We have received a new catalogue of canning machinery from Food Machinery (Mather and Platt), Ltd.

This is a well-produced booklet incorporating several plates in colour. It is bound in loose-leaf fashion to admit of later additions, and the descriptive matter has been carefully arranged to facilitate ready reference. A list of machines supplied by the company is noted on page 11. That this is an extremely comprehensive list may be gathered from the headings: Vegetables (General), Peas, Beans, Tomatoes, Spinach, Fruit (General), Apples, and Pineapples. Under the heading Fruit (General) the following machines are listed:

Picking and filling tables, syrup fillers, exhausters, rotary cookers and coolers, non-agitating cookers and coolers, box packing machines, gooseberry snippers, graders, washers, cherry stemmers, cherry seeders, and peach and apricot preparation machines.

Copies of the catalogue in question may be had on application to Messrs. Mather and Platt, Ltd.

* * *

Mr. F. J. Ballard, the governing director of the well-known Tipton firm of engineers, Messrs. F. J. Ballard and Co., Ltd., was among the recipients of the O.B.E. in the New Year's Honours list.

* * *

We regret to announce the death of Mr. G. W. Bradfield of the British Essence Co., Ltd. He is succeeded by his son, Mr. Arthur Bradfield.

* * *

Foodstuff Colours.

All kinds of Harmless Colours for Foodstuffs are listed in the catalogue issued under that title by Messrs. Chocroll, Ltd. The contents are too various to describe in detail, but in passing we may mention: colours for jams, butter colours, acid-proof colours for mineral waters, etc., colours for sausages and pickles, and a special golden yellow brown for kippers.

Messrs. Chocroll have also sent us a list of colour and flavour compounds and a leaflet describing Modhesive, an adhesive specially made by them for labelling purposes. Chocroll itself is a colour-flavour material prepared for use in chocolate swiss rolls and sponge beatings. Other flavouring specialities and food colours made by the same firm are well described in the foregoing pamphlets. A separate leaflet devoted to Butaroda describes what this substance is and how it should be employed. Those interested in butter flavours would do well to obtain a copy of this leaflet from Messrs. Chocroll, Ltd.

* * *

Food Companies in 1932.

The annual statistical report published by Messrs. Jordan and Sons, Ltd., Company Registration Agents, Chancery Lane, London, contains a good deal of interesting information relating to the registration of new companies during 1932.

Incredible, almost, as it may seem, the past year was a record year in this respect, the number registered being 10,204, or 139 over the previous record set up in 1920. Immediately one is impressed by the fact that of last year's 10,204 new companies less than the odd 204 (ignoring "guarantee" companies) were "public" concerns, the remaining 10,000 or so being by their very constitution prohibited from offering any shares or debentures to the public. In 1920 the total capital of all the companies registered reached the stupendous amount of £568,894,382, and roughly three-fifths of this was attributable to "public" concerns; but in 1932 the total was only £70,204,496, of which only about a quarter represented "public" companies.

It is here, state Messrs. Jordan, that the figures for 1932 reflect the commercial poverty, the lack of confidence, and the lack of opportunity which characterised the year. The registration of public companies (apart from reconstructions and amalgamations) has been almost stagnant.

Food manufacturers have been as busy as most, 14 new public companies having been registered as well as 837 private, a sum of £4,165,978 being involved in the total investments for the two entries. Messrs. Jordan state that this is nearly double the figure for 1931.

* * *

Canadian Maple Sugar.

The production of both maple sugar and syrup in Canada has increased considerably during the past year, the stimulus having apparently proceeded from the reduction in prices. The leading province in this connection is said to be Quebec, followed in order of importance by Nova Scotia, New Brunswick, and Ontario.

INFORMATION and ADVICE

FERMENTATION OF MINCEMEAT—HEALTH SALTS—POTATO CANNING—ROLLED OATS—DOG BISCUITS—FLAVOURING ESSENCES—CANE OR BEET SUGAR—GRAVY THICKENING—POTATO CRISPS—TABLETTING—POTATO "DOINGS"—ICING—BREAD IN SAUSAGE—PEELING GRAPEFRUIT—FRESH SAUSAGE—PUDDING POWDERS

Fermentation of Mincemeat.

1,062. *What is the cause of fermentation in mincemeat?* (Scotland.)

We would refer the enquirer to the July and October, 1932, issues of this journal for some light on this question.

An American chemist has recently investigated this matter, and claims that experimental work substantiates his theory that fermentation in mincemeat is due to the reaction of an excess of fruit acids upon an excess of sugar in the presence of acid bacteria. He proposes to eliminate or cut down the vinegar, to decrease the amount of added cane sugar, to boil all the liquid ingredients (fruit syrup and cider in the American formula) together with the sugar for 10 minutes, and allow to stand for 24 hours before mixing with the solid ingredients.

1,063. *Can you suggest the best publication for recipes of soups equal to the American soups now so freely marketed here?* (Liverpool.)

A suitable publication was recommended.

1,064. *We are in need of a formula for a cocoa preparation containing malt, milk, eggs, and cocoa (or similar substitutes); also a formula for rich, velvety cream ices, using cold milk only, and then freezing, or—if possible—milk powder instead of milk, and then freezing.* (Scotland.)

In answer to the first part of his letter, the enquirer was referred to the article by Dr. Laessing appearing in the present number. For information on cream ices he was referred to the November, 1931, issue.

1,065. *In Dr. Herd's "Review of Cereal Chemistry in the Year 1932," published in your recent issue, it is stated that "a bacteriological study of wheaten flour by Amos has become available. . . ." Information as to how a copy of this study may be obtained will be very much appreciated.* (Ireland.)

The work in question is filed as a thesis at London University, and no doubt it will be available at one of the libraries.

1,066. *We require the names and addresses of firms who can supply machinery for a sauce plant—viz., washing and drying, mixing and bottling, sealing and labelling, etc.* (London.)

Suitable names were forwarded, as well as names of label suppliers.

1,067. *You state that 12 grains of sodium iodide equal 10 grains of iodine. How many grains of potassium iodide equal 10 grains of iodine?* (England.)

This is a matter of arithmetic. 150 parts by weight of sodium iodide contain 127 of iodine; 166 parts of potassium iodide contain 127 of iodine.

Health Salts.

1,068. *Kindly supply a recipe for liver or health salts.* (Wales.)

As a base for experiments the following may be used:

Sodium bicarbonate	...	50 parts by weight.
Tartaric acid	... ...	25 " " "
Citric acid	... ...	20 " " "

The alkali and the tartaric acid are dried separately and mixed. The citric acid in fine powder is added quickly to the mixture, which is then worked on a steam-heated tray until it assumes the proper consistency for pressing through wire sieves of suitable mesh. The granules are further dried by a mild heat. It is important in preparing granular salines to secure an even distribution of moisture. On a larger scale, the drying is carried out in revolving drums fitted with scrapers.

The above is a basic mixture. Many ingredients may be incorporated, such as sodium sulphate, magnesium sulphate, oil of lemon, sugar, lithium carbonate, lithium citrate, and sodium phosphate.

1,069. *We shall be glad if you can give us some information re the use of albumen for clearing soup; how is this material used and what firm can supply it in London?* (London.)

Suitable firms were recommended and the enquirer referred to them for further information, as the quantity of albumen used and its method of incorporation will depend to a very large extent on the particular brand selected.

1,070. *We shall be obliged if you can supply the names of manufacturers of small machines for making yeast tablets.* (Burton-on-Trent.)

These were given.

1,071. *Confirming our telephone conversation of this afternoon, I would like to repeat that my firm would like to get in touch with manufacturers of finely ground sago.* (Farnham.)

A reliable source of supply was indicated.

1,072. *We should be glad if you would give us some information on the deodorising of soya oil and the oil extraction from soya bean.* (London.)

Information supplied.

Potato Canning.

1,073. *Please supply information on potato canning.* (Germany.)

Information on the canning of vegetables will be found in the *Food Industries Manual*. Retorting is at 240° F. for an hour, although, of course, the time depends on the size of can. Various methods are used for peeling, depending upon the kind of potato. Sometimes steaming is employed; in other cases machines with revolving brushes are used. Under certain circumstances the potatoes may be run through tanks of hot water and lye or some form of alkali preparation such as has been used so successfully for peeling peaches. Discoloration has to be guarded against by use of brine, a short, hot exhaust, and prompt sealing. The minimum of air should be left in the can.

1,074. *Is it possible to procure any dry gluten?* (Australia.)

As gluten is a by-product of starch, to obtain this should be easy. It is doubtful if large quantities of gluten that has been properly dried are obtainable. The drying of gluten on a large scale is a very difficult operation.

1,075. *Please send us names of firms who manufacture plant for granulating dried malted milk and filling the*

powder in weighed quantities into containers, the machine to operate in an atmosphere of inert gas. (Ireland.)

Names of firms were suggested.

1,076. *Will you be good enough to let us know where we can purchase a small machine for shredding or grating horse-radish?* (Somerset.)

Suitable sources were recommended.

1,077. *I should very much like to know where I can obtain cauliflower in brine and gherkins. Unfortunately I have run short of these two lines and will find myself hard pressed if I cannot get any.* (Sheffield.)

Names of suppliers were forwarded.

Rolled Oats.

1,078. *Can you say to what is attributed the differences in flavour between the various brands of rolled and flaked breakfast oats now marketed?* (Turkey.)

The particular grade of oats used and its country of origin—*i.e.*, influence of soil, climate, heredity, etc.—will have some influence. More important, however, is the particular method of processing adopted in the factory—*i.e.*, conditions of softening, steaming, rolling, and drying resulting in slight variations in the percentages of solubilised and dextrinised starch in the final product. In rolled oats the percentage of dextrine may be about 3½ per cent.

1,079. *Kindly supply information on the canning of crayfish.* (London.)

We would suggest referring to an article published in the November, 1932, issue of this journal. If there are any particular points upon which information is required we should be glad to provide it.

1,080. *We are interested in your reply to Enquiry* 1,028 *in the January issue of* FOOD MANUFACTURE, *and will appreciate your forwarding us a copy of the reply.* (Leeds.)

This was sent.

1,081. *Please put us in touch with makers of vacuum can closing machines.* (India.)

This was done.

1,082. *I am open to purchase supplies of stavesacre seeds from time to time. Can you put me in touch with a firm that can supply them?* (Cheshire.)

This was done.

1,083. *Please put us in touch with the makers of a non-rusting adhesive. We saw in your September issue a reference to "Tinezol." Who manufacture this?* (Australia.)

Suppliers of non-rusting adhesives, including the makers of "Tinezol," were indicated.

Dog Biscuits.

1,084. *We are wondering if you can supply us with any information or recipes on puppy meal, dog biscuits, and brown bread rusk for greyhounds.* (Scotland.)

We are under the impression that puppy meal consists largely of crushed dog biscuits.

Brown bread rusks for greyhounds are made by slicing stale brown loaves and then drying them off in a cool oven so that as little colour as possible is imparted to the crumb.

As regards dog biscuits, there are many varieties to-day containing fish, meat, or vegetables in addition to the ordinary products. Some are made from a partly fermented dough or chemically aerated.

A general formula such as the following will prove a safe guide:

Low grade flour ...	140 lb.
Oatmeal or ground oats	40 lb.
Baking powder	4½ lb. (or less if desired)
Salt	2½ lb.
Gallons of water ...	8¼.

If different varieties are required, mix in—

(*a*) 12 lb. fish meal and 1 quart vegetable or fish oil.
(*b*) 12 lb. chopped meat—windpipe or gullet.
(*c*) 12 lb. chopped vegetables.

The dough should be well made and then braked until smooth. It should be left to recover and then braked to the correct thickness and so prepared for cutting. Bake in an oven at 480° and finally dry out thoroughly in a warm oven.

1,085. *In your issue for June last you gave an illustration and particulars of Karl Kiefer double plate vinegar filter.* (*See page* 168.)

We should be obliged if you would ask the manufacturer of this machine to quote us for a filter suitable for filling direct from the filter into casks. Our output is not very large, somewhere in the vicinity of five or six thousand casks per annum. (New Zealand.)

The English agents for this machine were asked to communicate with the enquirers direct.

1,086. *We shall be glad to learn whether you can recommend a book (in English) on the manufacture of liqueurs; if so, please let us have details, and oblige.* (London.)

A suitable publication was recommended.

1,087. *We should be glad to have particulars of the Easi-Fold wrapper.* (Devon.)

These were given.

Flavouring Essences.

1,088. *Re your article on Flavouring Essences:* (1) *Where can we find tables showing the solubility of various essential oils in ethyl alcohol with various proportions of water?* (2) *How is the maximum amount of water calculated?* (3) *Is pea-nut oil a good solvent?* (London.)

Practically every book on essential oils contains information regarding their solubility in alcohols of various strengths. Tables of solubilities, printed in a very handy form, will be found in *Short Manual of the Most Important Odoriferous Chemicals and Aromatics*, by Schimmel.

With regard to the second part, this is simply a matter of arithmetic. Having settled the proportion of flavouring material required in a given volume of essence, one can find from the tables the minimum strength of alcohol which will dissolve this proportion. The strong essence is then diluted with water so that the alcohol is just above this strength. On diluting the alcohol with water, a certain contraction in volume takes place. This must be allowed for. Thus 66·66 parts by volume of alcohol containing 90 parts per volume mixed with 35·78 parts by volume of distilled water produce 100 parts by volume containing 60 parts of alcohol by volume. The necessary information can be got from dilution tables to be found in any work dealing with alcohol.

We have no special information relating to the solvent powers of arachis oil. We would imagine that these would be similar to the solvent powers of olive oil; that is to say, that it would be, in general, a good solvent for flavouring materials.

1,089. *When over on the Continent last month it was mentioned to me that there is an American product on the market called "Emargol," a colloid used as an emulsifier for the making of emulsions of the "oil-in-water" type.*

I have tried to find out the name of the manufacturers of this substance and, if possible, to obtain a sample, but I have not succeeded. I should therefore feel much obliged if you could possibly help me in this matter. (Liverpool.)

We are unable to trace "Emargol," the nearest we could find to it being "Emulgo." The enquirer was put in touch with the suppliers of the latter material.

1,090. *We should be glad if you would let us know, if possible by return of post, the names of manufacturers who could supply us with a lacquer for painting the inside of steel drums which have to contain a food product, such as a sugar syrup. The lacquer has to be odourless and tasteless, and of course insoluble in the product packed.* (London.)

Sources of supply were indicated by return.

1,091. *Can you give us the name of any British canner of tomatoes, or any firm which is likely to can this product during the coming season, and also the canners of British chickens?*

We are also anxious to get in touch with an Empire grown and canned brand of pineapple. We note in your October issue that a factory has now been equipped in British Guiana, and we believe that there are one or two firms of repute in the Federated Malay States and Singapore. If you could give us the names of such firms, or their British agents, we should be very grateful. (Birmingham.)

The necessary information was forwarded.

Cane or Beet Sugar.

1,092. *On page 91 of the 1932 edition of* Food Industries Manual *mention is made of the method of the Research Association for testing refined sugars. Complete details of this method are requested and I urge you to forward them to me at your earliest possible convenience.*

On page 90 of the Manual *is a statement concerning sugars suitable for chocolate manufacture, wherein refined beet sugar is said to be more desirable than refined cane sugar because it contains less impurities. This is quite contrary to other statements in the* Manual *as well as other published data and the experience of myself. Please advise if this is an error.* (Texas, U.S.A.)

The method of testing refined sugar is that of the British Association of Research for the Cocoa, Chocolate, Sugar, Confectionery and Jam Trades. As you will realise, these methods are strictly confidential and therefore cannot be published, but the methods we have given in the *Manual* can be relied upon as giving every satisfaction.

Regarding your enquiry concerning the statement on page 90, we cannot see where we are at fault. If you read carefully you will find we state, "cane and beet sugar are equally good for chocolate, although *opinion is held by some authorities* that refined beet contains less impurities and in grinding yields a powder less inclined to form lumps."

The essence of this statement is perfectly true; namely, that—*opinion is held by some authorities.* The fact that you have found it to be contrary does not detract from the fact that other authorities have found the reverse. It is therefore no error in printing.

Our opinion in this case is that cane or beet sugar is equally good for chocolate and there is nothing to choose between them, as present day refining has not got to such a fine art.

1,093. *We should be very much obliged if you could give us a list of the exhibitions being held this year in connection with any branch of food production.* (Gloucester.)

These were given.

1,094. *Will you please put us in touch with firms who make ice-cream filling machines?* (London.)

This was done.

1,095. *We shall be pleased if you can supply us with the name of the manufacturers of the "Fruit Field" brand of glacé cherries. Also, with regard to anchovy essence, we trust you have forwarded our name.* (London.)

Name of manufacturers supplied as requested. The enquirer's name had already been forwarded in connection with anchovy essence.

Gravy Thickening.

1,096. *Kindly supply formula for thickening, colouring, and seasoning gravies, soups, etc.* (London.)

The bases of these are usually selected cereal or potato flours or starches, salt, and caramel. We have previously given examples. For flavouring crude glutamate (for meat taste) or vegetable, extracts or powders and spices may be added. The range of possibilities is almost infinite, depending on flavour and consistency required and the purposes for which the product is intended. Corn and sago flours are common ingredients.

1,097. *We note with interest enquiries numbered 962 and 984. As we supply complete pea canning lines and plant for the production of glacé cherries and candied fruit, we should be greatly obliged if you would give us the names of the parties interested, so that we may get in touch with them.* (London.)

Names and addresses were given.

1,098. *Can you give me a recipe for making chocolate coralettes and sugar strands by machine?* (London.)

As the manufacture of coralettes is a closely guarded and somewhat complicated process, the enquirer was referred to the services of a recognised expert in this particular branch of confectionery.

1,099. *Reverting to Enquiry No. 998 and the subject of glass jars for packing cheese, will you please give me particulars of where to procure such jars, and also of the type of cheese usually packed therein?* (Yorkshire.)

Information supplied.

Potato Crisps.

1,100. *Please outline an up-to-date method of manufacturing potato crisps.* (Scotland.)

The following is suggested as a scheme which might form the basis of operations:

1. Potatoes peeled by abrasive machines.
2. Slicing by machine.
3. Slices washed in running water to remove surface starch and fibre particles.
4. Slices placed in cotton mesh bags and dried in centrifuge.
5. Slices placed in 30 lb. batches in baskets (metal) and lowered into vats of high-grade vegetable oil heated to 350-375° F., and cooked for, say, about three minutes. Vats might measure 6 × 2 × 2½ ft., made from heavy sheet metal, and contain 125 gal. of oil. They are set in a brick furnace heated by oil burner. At one end of cooking vat is a drain pan to hold two baskets of cooked crisps to drain into vat.
6. Each 100 lb. sliced potatoes would give about 30 lb. crisps containing 10 lb. oil.
7. Each day oil run from vat through centrifuge and clarified and pumped back into vat.
8. When partly cooled crisps are packed into printed glassine bags waxed on both sides and heat-sealed. Corrugated paper cartons are used as handling and shipping containers.
9. Only fully matured potatoes, which are free from chilling or frosting or wet conditions, are used.

1,101. *We are particularly interested in passion fruit pulp at the moment and should be glad to receive the name and address of the firm referred to in Enquiry No. 977.* (Surrey.)

Name and address supplied.

1,102. *Our clients abroad who have successfully started pig farming require some literature dealing with ham or bacon curing and have asked us to obtain same.*

If you could offer us any suitable publication we should be much obliged.

A suitable book was recommended.

1,103. *Please put me in touch with suppliers of round tins for tongue canning. The tins will be required to hold up to 6 lb. I am enclosing information as to the type of sealing machine in my possession.* (Birmingham.)

Source of supply indicated.

Tabletting.

1,104. *I am particularly interested in making a lemonade tablet; and one of my difficulties is the actual tabletting of the article, for the sugar gums up my machine.* (Australia.)

This is no doubt due to the inversion of the sugar by the citric or tartaric acid. One possible way is to dry the powders separately, mix thoroughly, moisten with alcohol, rub through a No. 20 sieve, dry thoroughly and then pass through the tabletting machine. Sometimes gum acacia is incorporated.

One method used for making tablets of this kind is to mix

8 oz. of icing sugar with 1 oz. each of sodium bicarbonate and tartaric acid and 10 drops of oil of lemon. Make this powder into a paste with sufficient rectified spirit. Roll out the mass to the thickness of ¼ in. upon waxed paper, divide into squares, and dry at a gentle heat.

1,105. *We shall be obliged if you will put us in touch with the makers of plant for the manufacture of potato crisps.* (Scotland.)

This was done.

1,106. *Reverting to Enquiry No. 977, I note that your South African correspondent is wondering whether there are any prospects in the United Kingdom for passion fruit (grenadilla) pulp.*

It occurs to me that he may like to investigate the possibilities of business in this product with the United Kingdom, although I imagine that it would require a great deal of courage and energy to get anything like a workable demand.

My object in writing you on the matter is to say that should he decide to find a market here, I would be very pleased to co-operate to the best of my ability to this end. (London.)

This offer was passed on to the original enquirers.

1,107. *Can you tell me where to obtain commercial lemon juice, lemon peel gratings, and lemon pulp?* (Yorkshire.)

Information supplied.

1,108. *Could you give me some information on the preparation of shredded wheat flakes?* (Malines.)

This being an enquiry which cannot be dealt with in correspondence, as so much depends on the type of flake required, output, etc., the enquirer was advised to get in touch with makers of suitable machinery.

1,109. *We shall be glad if you will kindly favour us with the names and addresses of enquirers 963 and 965.* (London.)

These were given.

1,110. *Please supply names and addresses of firms who can supply the following machines: (1) For washing and drying glass moulds and jars; (2) for labelling meat and fish paste jars; (3) a can opening machine either mechanically or hand driven; and (4) multiple filling machines for meat and fish pastes.* (Scotland.)

Suitable sources of supply were indicated.

1,111. *Please inform us as to the best method of preparing sterilised cream. Also name the firms who can supply the necessary plant, bottles, etc.* (Cornwall.)

The preparation of sweet, sterile cream for retail in small containers is discussed by B. H. Webb in *Journal of Dairy Science*, vol. xiii., No. 3 (see also U.S. Patent No. 1,646,671).

He concludes from experiments that the best way is to pre-heat a cream containing 20 per cent. butter fat at 80° C.; then to homogenise it at 3,000 lb. pressure, followed by cooling and sterilising in bottles at 118° C. for 12 to 14 minutes.

Homogenisation is to prevent separation of fat during long periods of storage, but the percentage of butter fat present has an influence on the stability. Above 20 per cent. the stability is lowered and vice versa.

Heat treatment alone only slightly lowers whipping quality, whereas homogenisation seriously impairs it, roughly in proportion to the pressure applied.

When put up in tin cans, the cream always develops a rancid flavour. Webb advises the use of glass bottles and lining the caps with parchment or special cardboard, rather than composition work which blackens the top layer of cream.

Potato "Doings."

1,112. *Should be glad to have your suggestions as to possible methods of preserving a food product consisting of potatoes "done" in fat.* (Ireland.)

Much depends on what happens in the "doing" process. Chemical preservatives are out of the question. One would obviously have to keep the water content down to a minimum, choose a stable fat with minimum tendency to rancidity, incorporate as much salt as taste allows, pack so as to exclude air, and observe strictly all the usual rules of hygiene from beginning to end of the process. The question is very vague.

1,113. *We should be much obliged if you would give us some information on the drying of clipfish.* (London.)

This matter was personally discussed with the enquirer.

Icing.

1,114. *We should be very greatly obliged if you could give us some useful recipes for the commercial preparation of icing for cakes.* (London.)

See the article published in the present issue.

1,115. *We are sending you a sample of lemon curd. Wanted, a formula to match it.* (Yorks.)

As noted above, we are quite willing to pass on samples to experts having laboratory facilities for making any tests, analyses, or other forms of examination and for making up products to match samples. As regards information of a general character on the manufacture of lemon curd, this will be found in the May, 1931, issue.

Bread in Sausage.

1,116. *We are convinced that the most satisfactory sausage is produced by incorporating bread. Would you kindly let us have your opinion as to the method of preventing bread from souring?* (England.)

We do not see how it is possible to get over the souring difficulty if moist bread is used, unless, of course, it is used immediately. It is common practice to steam loaves immediately before use.

We would suggest making a well aerated loaf and then drying this out at a low temperature until most of the moisture is driven off; the bread will then keep well. As long as a certain amount of moisture is present, bread will form a good medium for mould and other organisms.

Perhaps you could furnish some more details as to exactly how you use bread in sausage making.

Peeling Grapefruit.

1,117. *Can you inform us if there is any special method of peeling grapefruit and removing the pith?* (London.)

One method is to peel and trim by hand, using curved knives of special design.

Another method is to place the fruit in boiling water for about three minutes to loosen the skin so that it can be easily removed. This, of course, will leave the white bitter pith covering the fruit.

This may be removed by passing the fruit under a spray of boiling 2-2½ per cent. caustic soda for thirty seconds and then passing through fresh cold water to remove any free alkali present as well as any membrane clinging to the fruit.

It would appear that there is the danger of a certain amount of flavour being lost when plunging into boiling water and care must also be taken that the flavour is not affected by the caustic treatment.

Instead of using caustic soda it would be better to employ a less caustic solution of a reputable cleansing agent of alkaline character.

1,118. *We are sending you a sample of egg substitute and shall be glad to have a recipe for this.* (Karachi.)

We have passed this on to a consultant, as a job such as this involves chemical and experimental work.

Fresh Sausage.

1,119. *We should be glad to know the process of manufacture which enables Cumberland sausage to keep in a fresh condition.* (England.)

It is difficult to give you anything definite in the way of

advice without knowing the process you follow and the materials you use.

It is necessary to take great care in handling raw materials. Whenever possible, bone out raw meat before chopping and use always the same proportion of fat and lean. In all operations keep the temperature down. Use a bowl for cooling in preference to wooden trays or boxes so as to retain the meat fluids. Soak the filler at as near the temperature of the meat as possible. Handle the meat as little as you can. The period for chopping should always be the same. Keep a uniform fineness of chopping. Do not soak the casings too long. After putting casings on nozzle, squeeze dry with a clean wiper. The addition of a little colour, say in the form of a rose-pink solution, is useful.

Pudding Powders.

1,120. *Could you give us particulars of the composition of the different custard and pudding powders on the market?* (France.)

This, of course, is not "cricket," even if we knew the compositions of products already on the market. We have several times previously given general information on the basic composition and methods of preparing custard powders. We have some recipes for pudding powders, but these do not by any means embrace all the many possible varieties. If you want to match any particular product it is best to secure the services of a consultant or a good practical man of experience.

1,121. *We desire to obtain a shaker for use after sterilisation, in which cases of evaporated milks are placed and shaken with an eccentric motion. A description of one of these machines is given in Hunziker's* Condensed Milk, *page 187. We shall very much appreciate any help you can give us in putting us in touch with an English manufacturer.* (Surrey.)

We were unable to trace any firm making standard equipment for this purpose, but names were given of enquirers capable of producing such a machine to order.

1,122. *I notice on page 351 of your November issue a reference to the "Easi-Fold" device for facilitating hand wrapping in transparent coverings. I shall be very glad if you can give me the address of L. T. Lauder of Leeds in order that I may obtain further particulars.* (Birmingham.)

The address was given.

1,123. *We are sending you a sample of piping jelly. Could you please indicate how to manufacture this product?* (Lancs.)

An article on this subject was published in the February, 1932, issue.

Dry Heat Sterilisation

SOME time ago a question was put to us about the sterilisation of dairy utensils by means of dry heat. In this connection it is interesting to note the recent publication of Bulletin No. 612, by A. C. Dahlberg and J. C. Marquardt (New York State Agricultural Experiment Station, Geneva, June, 1932), recording the results of some experiments. The conclusions arrived at may be summarised as follows:

Results in "sterilising" dairy utensils comparable to those obtained with live steam were secured in a dry heat "steriliser," generating water vapour from the wet utensils.

A temperature of 212° F. maintained for 15 minutes, produced either with steam or dry heat, rendered wet utensils equally free from bacterial contamination.

A temperature of 200° F. maintained for at least 10 minutes was required in moist air "sterilisation" by dry heat to render utensils sufficiently free from organisms for practical use. This temperature and time was sufficient to kill all bacteria of the colon-aerogenes group, to dry the utensils, and to reduce the bacterial contamination to insignificant numbers.

Temperatures of 200° F. or above for 10 minutes should include either the time required to heat or the time required to cool the container.

"Sterilisation" by the application of dry heat to wet utensils appears to be a practical method of "sterilising" dairy farm equipment on farms producing high-grade milk. It eliminates the need for steam and dries the utensils.

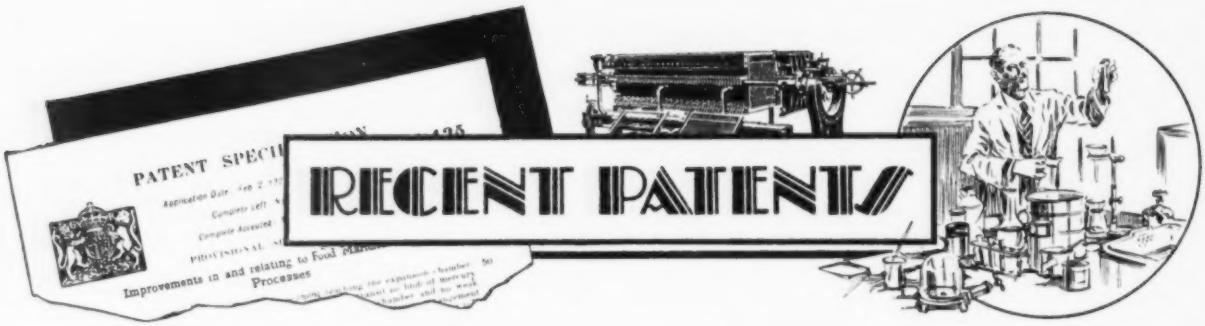
Modern Box Design

AN interesting exhibition of over three hundred modern designs, suitable for all kinds of cardboard boxes, will be held at the British Industries Fair at Stand B.44.

These designs, which are the work of several eminent artists, including members of the Royal Academy, are being exhibited by Messrs. Robinson and Sons, Ltd., the well-known cardboard box manufacturers, of Chesterfield.

After a good deal of consideration, they have been brought forward in view of the increasing public interest in really up-to-date and artistic productions. Messrs. Robinson state that, though thoroughly modern in conception, they do not represent the absolute extremes of modern art. Their appeal to those aware of the importance of the relation of art to industry should, therefore, it is believed, be considerable.

Chicken Plucking by Machine at Ightham.



These particulars of New Patents of interest to readers have been selected from the "Official Journal of Patents," and are published by permission of the Controller of H.M. Stationery Office, and the "Official Journal of Patents" can be obtained from the Patent Office 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

Latest Patent Applications

36513. CHIVERS AND SONS, LTD., and RENDLE, T.: Manufacture of jellies. Dec. 23.

36037. DEAL, W.: Cooking apparatus. Dec. 20.

36150. HARGER, J., and JONES, E.: Cooking, etc., utensils. Dec. 21.

36185. LLOYD, J. O.: Cooking basins, etc. Dec. 21.

36920. ROTHE, C.: Method of producing article of food. Dec. 30.

Specifications Published

385,459. SNELL, C. SCOTT: Portable food warmer.

385,200. FUCHS, W.: Preparation of powder for making custards, puddings, creams, sauces, ice-creams, and like boiled products.

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 1s. each.

Abstract Published

Group Abridgments can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, either sheet by sheet as issued on payment of a subscription of 5s. per group volume, or in bound volumes price 2s. each.

380,107. **Preserving cream.** HARTMANN, S. H., 200, King Street, Melbourne, Australia.

A cream, the fat content of which is equivalent to or greater than that of butter and which is obtained by pasteurising centrifugally produced cream and then recentrifuging it, is passed whilst hot into containers which are immediately sealed under vacuum. The containers may then be cooled prior to transportation. The whole of one day's production of cream may be collected in one receptacle, in which it is agitated by mechanical means and while still hot passed into the containers.

New Companies

SCRIBBANS'S PURITY BREAD, LIMITED. Scribbans's Purity Bread Bakery, Lodge Road, Hockley, Birmingham. To carry on the bus. of bakers, as formerly cd. on by J. H. Scribbans at Birmingham and elsewhere. Nom. Cap.: £150,000 in £1 shares (40,000 pref. and 110,000 ord.).

CHOCOLATE BOX, LIMITED. 19, The Wicker, Sheffield. To carry on the bus. of mnfrs. of and dlrs. in confectionery, chocolates, etc. Nom. Cap.: £2,500 in £1 shares.

ALFRED ASHLEY AND COMPANY, LIMITED. 456 and 458, Hackney Road, E. 2. To carry on the bus. of mnfrs. of and dlrs. in pickles, vinegar, sauces, condiments, etc. Nom. Cap.: £2,000 in £1 shares.

V. HARRISON, LIMITED. 94, Church Road, Hove. To take over the bus. of a mnfg. and wholesale and retail confectioner cd. on at 58a, West Street, Brighton. Nom. Cap.: £200 in £1 shares.

J. B. FOOD PRODUCTS, LIMITED. To take over the bus. of a potato crisp mnfr. cd. on at Knaresborough. Nom. Cap.: £1,000 in £1 shares.

FORSTERS BISCUITS, LIMITED. To acquire any biscuit mnfg. business; to carry on the bus. of bakers and confectioners, etc. Nom. Cap.: £5,000 in £1 shares.

EDWIN BROWN AND SON, LIMITED. To carry on the bus. of corn and agricultural mchts. and bakers and confectioners cd. on at Station Street and Market Place, Bingham, Notts, as Edwin Brown and Son. Nom. Cap.: £1,000 in £1 shares.

CLEAN FOOD SERVICE, LIMITED. 163, Blythe Road, Kensington, W. 14. To carry on the bus. of mnfrs. of and dlrs. in foodstuffs, etc. Nom. Cap.: £200 in £1 shares.

PRIMARY PRODUCTS, LIMITED. The Old Brewery, Portico, Prescot. To carry on the bus. of farmers, produce, fruit and vegetable mchts., etc. Nom. Cap.: £1,000 in £1 shares.

NORTH OF ENGLAND BACON COMPANY, LIMITED. To take over the bus. cd. on at 12, Cathedral Street, Manchester, by the North of England Bacon Co., Ltd. Nom. Cap.: £5,000 in £1 shares.

BURWILLS, LIMITED. 11, Queen Victoria Street, E.C. 4. To carry on bus. as mnfrs. of and dlrs. in confectionery, etc. Nom. Cap.: £3,000 in £1 shares.

BONNER AND DURRANT, LIMITED. To take over the bus. of cider and perry makers and mchts., cd. on at Holmer, Hereford, as Bonner and Durrant. Nom. Cap.: £2,000 in £1 shares.

SUSSEX SUGAR COMPANY, LIMITED. Capel House, 54, New Broad Street, E.C. 2. To carry on the bus. of mnfrs. and/or refiners of and dlrs. in sugar, etc. Nom. Cap.: £2,000 in £1 shares.

HOLBORN BAKERIES, LIMITED. (271866.) To take over the bus. of bakers, etc., cd. on at 11, Holborn Place, 41, St. John's Road, and 10, Russell Street, all in Plymouth. Nom. Cap.: £4,000 in £1 shares.

GARDNER FREEZERS, LIMITED. (271862.) To carry on the bus. of mnfrs. of and dlrs. in freezing plant and apparatus, etc. Nom. Cap.: £100 in £1 shares.

MARCH AND SON, LIMITED. (271461.) 262, Liverpool Road, N. 1. To carry on the bus. of bakers and confectioners formerly cd. on at 262, Liverpool Road, Islington, N., and 15, Old Kent Road, S.E. Nom. Cap.: £1,500 in £1 shares.

FRUITSALES, LIMITED. (271612.) To carry on the bus. of importers and exporters of and dlrs. in fruits, nuts, vegetable products, wines, etc. Nom. Cap.: £10,000 in £1 shares (5,000 "A" and 5,000 "B").

PINNER GREEN BAKERY COMPANY, LIMITED. (271795.) Bell Close, Pinner Green, Pinner, Middlesex. To carry on the bus. of bakers, etc. Nom. Cap.: £500 in £1 shares.

The above-mentioned particulars of new companies recently registered have been extracted from the daily register of Messrs. Jordan and Sons, Ltd., company registration agents, Chancery Lane, W.C. 2.